

**FAUNA OF
BILIGIRI RANGASWAMY TEMPLE
WILDLIFE SANCTUARY
(KARNATAKA)**



Zoological Survey of India

Conservation Area Series, 27

Fauna of Biligiri Rangaswamy Temple Wildlife Sanctuary (Karnataka)

Edited by
The Director, Zoological Survey of India, Kolkata



**Zoological Survey of India
Kolkata**

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FAUNA OF BILIGIRI RANGASWAMY TEMPLE WILDLIFE SANCTUARY

CONSERVATION AREA SERIES

No. 27

2006

1-263

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AN OVERVIEW

G. THIRUMALAI and S. KRISHNAN

Zoological Survey of India, Southern Regional Station, Chennai–600 028

INTRODUCTION

The Biligiri Rangasamy Temple Wildlife Sanctuary (BRTWLS), geologically belonging to the 'Biligiri White rock' formation, historically assigned to the properties vested with the famous Rangaswamy Temple, fanning out to an area of 540 sq. kms, located 114 km southeast of Mysore, is presently part and parcel of the newly framed Chamrajnagar district of Karnataka. Biogeographically, this sanctuary located at the eastern most edge of the Western Ghats, between 11° and 12°N along its North-South running chain, projects itself in a North easterly direction, meets the splintered hills of the Eastern Ghats at 78°E, thus forming an unique extension of Western Ghats. Because of this unique location Biligiri Rangaswamy Temple Wildlife Sanctuary is in the middle, constituting a live bridge between the Eastern and Western Ghats (Ganeshaiah and Uma Shaankar, 1998). This sanctuary (11°40"-12°09"N and 77°05"-77°15"E), brought under Wildlife Protection Act during 1972, conferred the status of Wildlife sanctuary in 1987, is considered to be predominantly composed of Western Ghats' natural constituents with significant proportion of eastern elements as well. In other words, BR hills are known as a geological chip of the Western Ghats. This sanctuary has something to every visitor, from a casual tourist in search of a peaceful sojourn, to a serious professional naturalist in pursuit of newer vistas in biodiversity assessment. It's value gets doubled as it forms a biological bridge between the Eastern and Western Ghats.

Because of its unique location Ganeshaiah and Uma Shaankar (1998) considered this sanctuary a biogeographic bridge of the Deccan plateau. The altitudinal variations are very wide, 600 m-1800 m from the median sea level and hence the naturalists expect a high degree of biodiversity. The wide range of climatic conditions also contributes to heterogeneous assemblage of habitats such as, shrubs, deciduous, riparian, evergreen, sholas, grasslands, etc. The drainage system flowing in these hills are in two distinct directions, the northern flowing streams converge into Gundalhalla and the south flowing streams into Swarnamukhi river.

FLORA

Floristically Biligiri Rangaswamy Temple Wildlife Sanctuary is rich with 800 species of higher plants belonging to 445 genera and 123 families. Since Combretaceae is the most predominant member, Biligiri Rangaswamy Temple Wildlife Sanctuary is considered to be the Combretaceae-rich forest. About 58% of the flora are herbs while the rest constitute trees, shrubs and climbers (Ganesan, 1998).

FAUNA

Faunal wealth of certain groups, especially large games is fairly known, while information on invertebrates is scanty. This sanctuary is a paradise for viewing large games. There are 26 species of Mammals reliably recorded in the sanctuary including gaur, sambar, cheetal, barking deer, four horned antelope, tiger, leopard, wild dog, lesser cats, sloth bear, rhesus monkey and giant flying squirrel. The avian fauna of Biligiri Rangaswamy Temple hills comprises of 249 species belonging to 49 families including 33 rare and 47 migratory species.

Biligiri Rangaswamy Temple Wildlife Sanctuary is known to possess 22 species of reptiles of which 13 species under 6 families are recorded in this volume. Among the amphibians 19 species under 4 families have been studied and recorded in this sanctuary. The fish fauna from this sanctuary includes 25 species under 9 families accommodated under 3 orders, out of which 8 are endemic to India. The representative number of genera and species of Biligiri Rangaswamy Temple Wildlife Sanctuary is given below :

S. No.	Faunal Group	No. of genera	No. of Species
1.	Rotifera	6	8
2.	Mollusca (Gastropoda)	4	6
3.	Crustacea : Cladocera	5	6
4.	Crabs (Potamoniidae : Decapoda)	2	3
5.	Insecta: Odonata	7	8
6.	Insecta : Orthoptera	17	17
7.	Insecta : Hemiptera (Terrestrial)	38	49
8.	Insecta : Hemiptera (Aquatic and Semiaquatic)	25	37
9.	Insecta : Coleoptera	6	7
10.	Insecta : Coleoptera (Scarabaeidae)	10	65
11.	Insecta : Diptera : Tephritidae	3	3
12.	Insecta : Lepidoptera (Rhopalocera)	14	20

S. No.	Faunal Group	No. of genera	No. of Species
13.	Insecta : Hymenoptera (Formicidae)	36	109
14.	Insecta : Hymenoptera (Apocrita)	9	9
15.	Arachnida : Scorpions	4	4
16.	Arachnida : Spiders	7	7
17.	Pisces	19	25
18.	Amphibia	9	19
19.	Reptilia	13	13
20.	Aves	155	248
21.	Mammalia	31	35

ACKNOWLEDGEMENTS

This document is due to the concerted efforts of several individuals right from submission of survey proposals to the successful publication of the data collected from various sources. It will be insufficient if just a word of thanks is expressed to Mr. S. K. Chakrabarti, IFS, the then Principal Chief Conservator of Forests and Chief Wildlife Warden, Karnataka Forest Department, Government of Karnataka, Bangalore. He had not only been instrumental in granting Zoological Survey of India the permission to survey the Biligiri Rangaswamy Temple Wildlife Sanctuary at our convenience but also ensuring the safety to the survey party members as well as providing essential manpower requirements for faunistic collections. Mr. Vijay Kumar Gogi, IFS, the then Divisional Forest Officer, Chamrajnagar division, extended full-hearted co-operation and infact showed a great interest in our survey procedures. The range officers gave us the best possible logistic support inside the Biligiri Rangaswamy Temple Wildlife Sanctuary. Worth mentioning here is the involvement of Shri. Rachaiya, Forest Guard, K' Gudi.

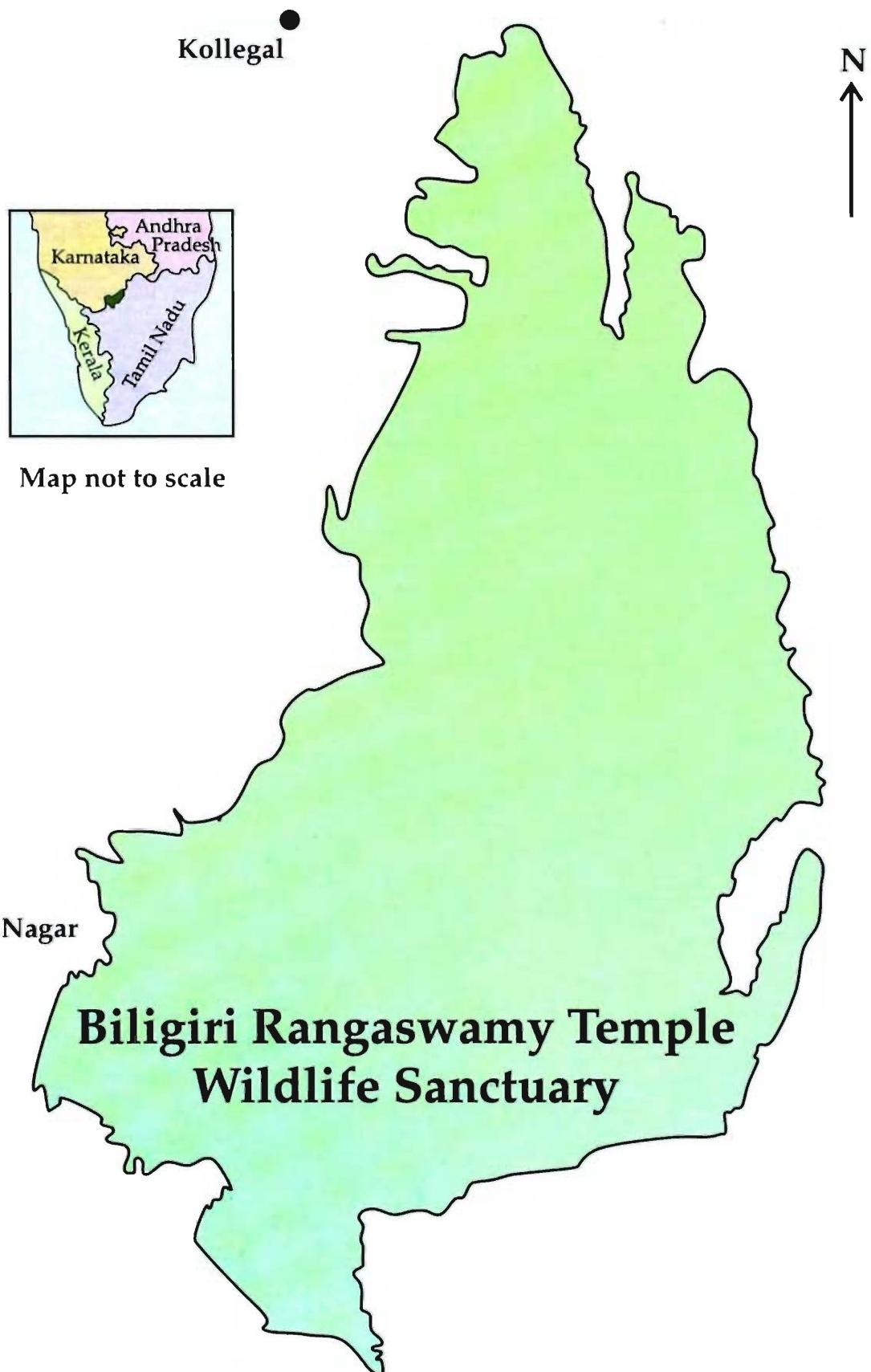
ATREE, Bangalore, the NGO, involved in biodiversity conservation with its unit in Biligiri Rangaswamy Temple Wildlife Sanctuary provided several facets of information and contributed a few papers in this document for which thanks are extended to Dr. Gladwin Joseph, Director, ATREE, Bangalore and his associates. Thanks are due to Dr. J. C. Daniel, for photographs of *Bufo melanostictus* & *Rana curtipes* and to Dr. S. K. Dutta for *Microhyla sholigari*.

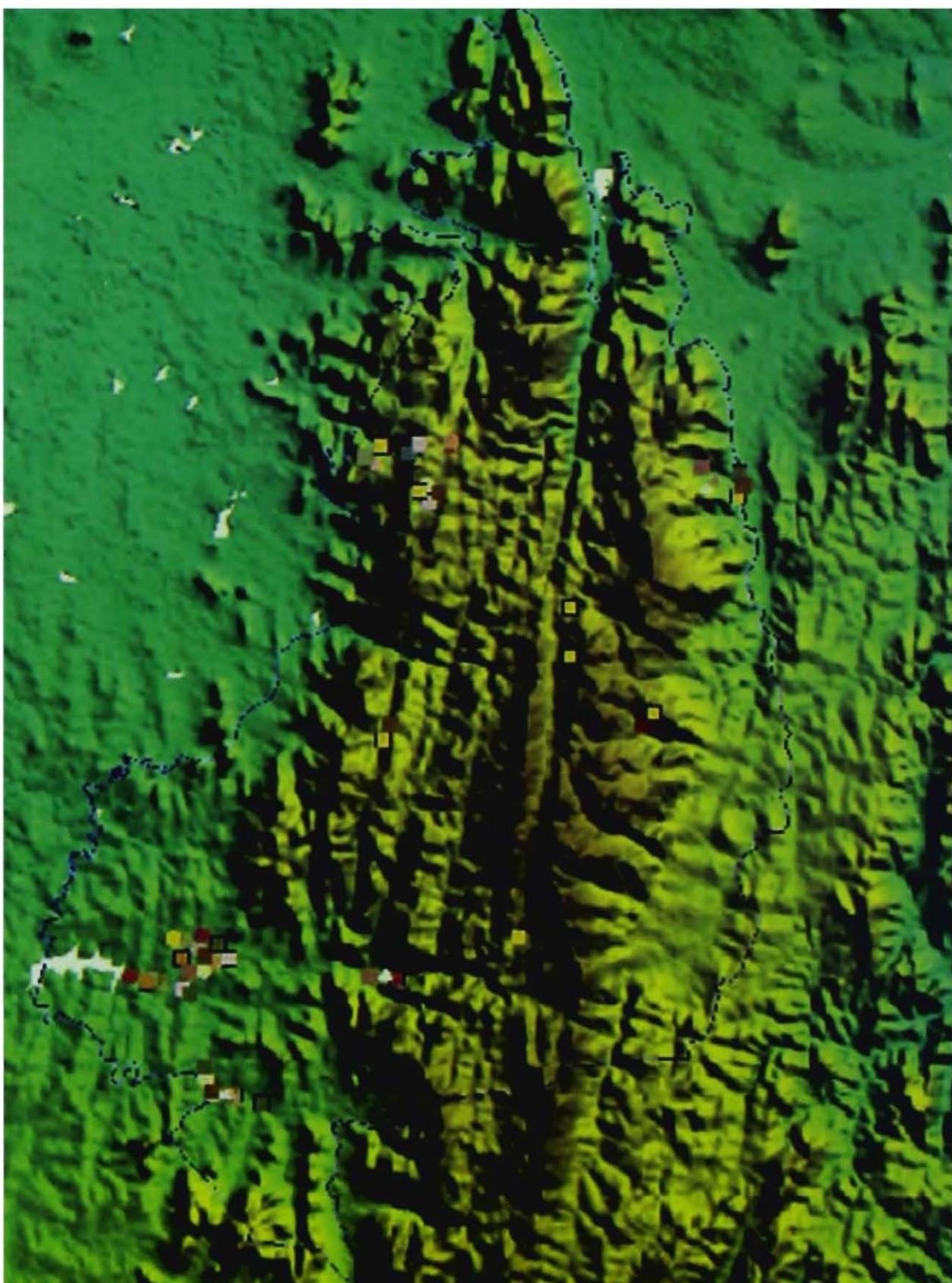
The staff members of Zoological Survey of India, Southern Regional Station, took maximum efforts in organising the participation component and the following survey party members meticulously collected and preserved faunal elements for laboratory analysis : S/Shri. D. Paranthaman, J. Letchumanan, G. Sankaran, V Arumugam, J. Ramalingam, P. Ekambaram, M. Doss, T. Sadhu, S. Lourdusamy, G. V. Soundararajan, D. Sivaji, P. Tamilvanan. The assistance of S/Shri. E. Seshan, G. Sankaran, Photographers

and K. Margabandhu, Artist is acknowledged. A special word of appreciation to Dr. R. Suresh Kumar, Fellow, Zoological Survey of India, Southern Regional Station, Chennai who volunteered to computerise the data and to effect revisions in the manuscript.

REFERENCES

- GANESAN, R. 1998. Vegetation map of New report for Biligiri Rangaswamy Temple Wildlife Sanctuary. In : New report for Biligiri Rangaswamy Temple Wildlife Sanctuary. Natural history, Biodiversity & Conservation. Published : ATREE & Vivekananda Girijana Kalyana Kendra, Bangalore : 6–9.
- GANESHAIAH, K. N. & UMA SHAANKAR, R. 1998. New report for Biligiri Rangaswamy Temple Wildlife Sanctuary : A biogeographic bridge of the Deccan plateau. In : New report for Biligiri Rangaswamy Temple Wildlife Sanctuary : Natural history, Biodiversity & Conservation. Published : ATREE & Vivekananda Girijana Kalyana Kendra, Bangalore : 4–6.





5 0 5 10 15 Kilometers

Satelite image of Biligiri Rangaswamy Temple Wildlife Sanctuary

A few habitats in Biligiri Rangaswamy Temple Wildlife Sanctuary



A view of the Sanctuary



BRT Hills near Kyat Devaraya Gudi



M. G. Cross near Basavanagudi

Crabs of Biligiri Rangaswamy Temple Wildlife Sanctuary



1. *Barytelphusa (Barytelphusa) cunicularis* (Westwood)



2. *Barytelphusa (Barytelphusa) guerini* (Milne-Edwards)



3. *Spiralothelphusa hydrodroma* (Herbst)

Odonata of Biligiri Rangaswamy Temple Wildlife Sanctuary



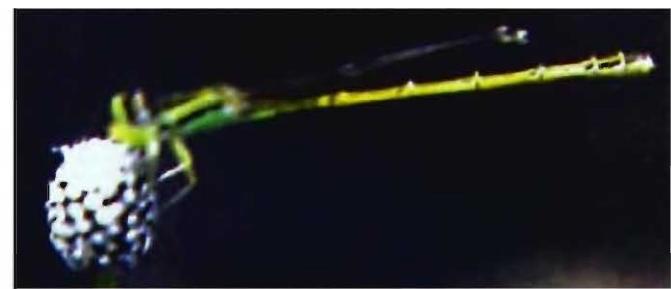
Ischnura aurora aurora



Pseudagrion rubriceps rubriceps



Libellago lineata indica



Argiocnemis pygmaea



Orthetrum sabina sabina



Orthetrum pruinosum neglectum



Diplacodes trivialis

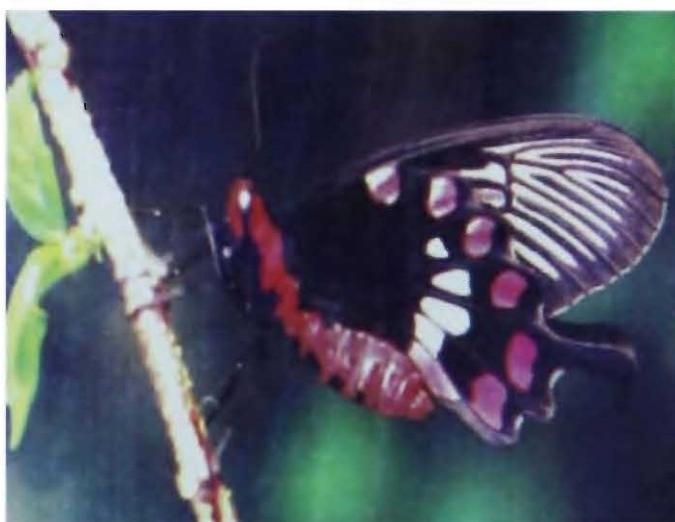
Butterflies of Biligiri Rangaswamy Temple Wildlife Sanctuary



Junonia lemonias (Linnaeus)



Papilio polymnestor Cramer



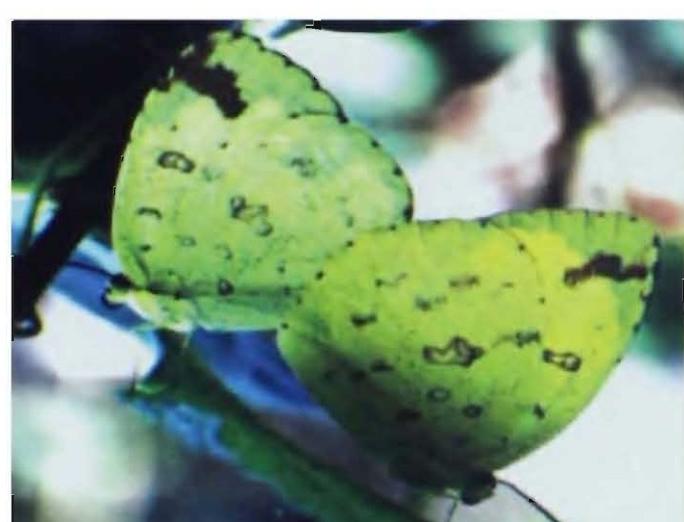
Pachliopta hector (Linnaeus)



Euploea core (Cramer)



Cyrestis thyodamas Boisduval



Eurema blanda (Boisduval)

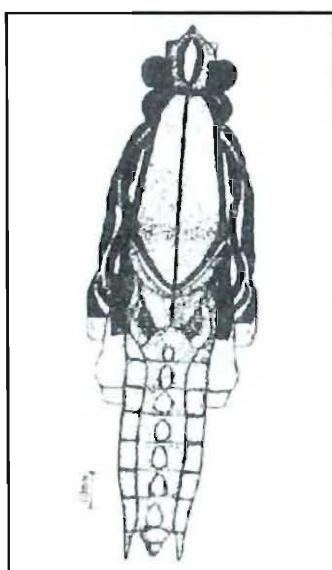
Hemiptera of Biligiri Rangaswamy Temple Wildlife Sanctuary



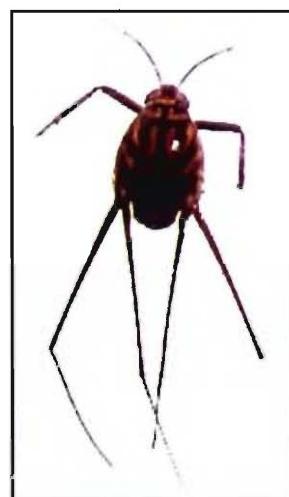
Lethocerus indicus (Lepeletilar & Serville)



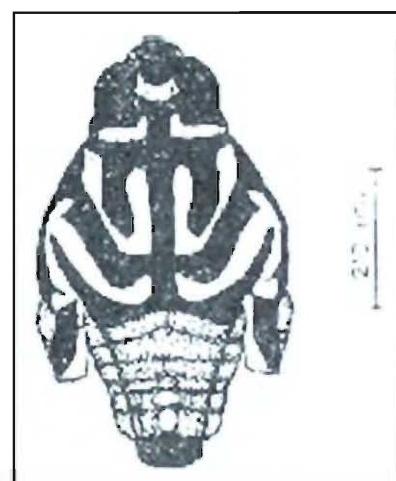
Laccotrephes ruber (Linnaeus)



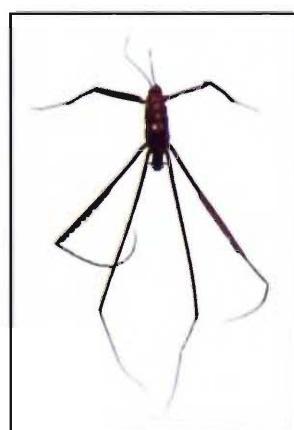
Limnometra anadyomene (Kirkaldy)



Metrocoris communis (Distant)



Metrocoris malabavicus Thirumalai



Ptilomera (Ptilomera) agroides Schmidt

Diptera of Biligiri Rangaswamy Temple Wildlife Sanctuary

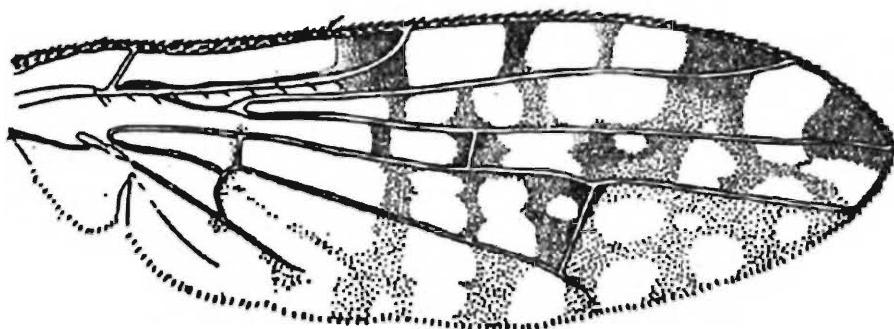


Fig. 1. *Dioxyna sororcula* (Wiedemann)-wing

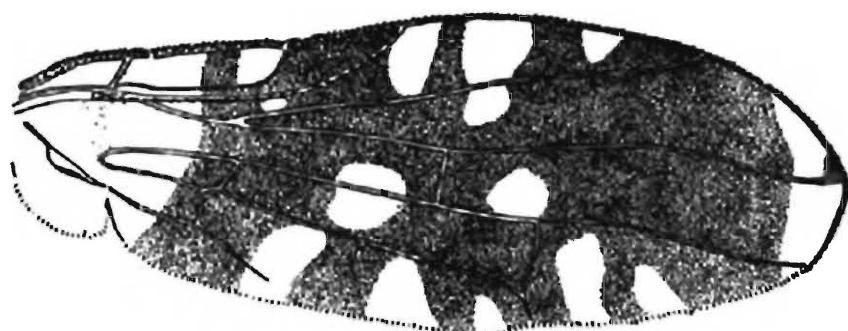


Fig. 2. *Spathulina acroleuca* (Schiner)-wing

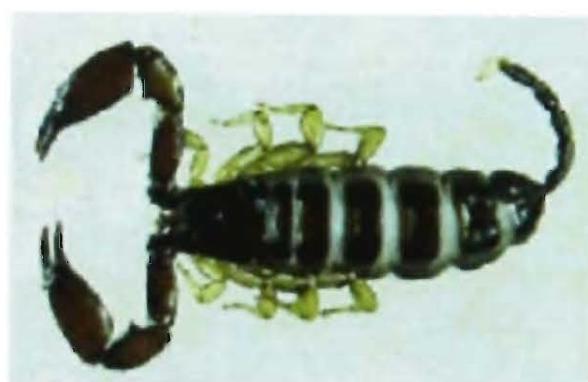


Fig. 3. *Procecidochares utilis* Stone

Scorpions of Biligiri Rangaswamy Temple Wildlife Sanctuary



Lychas (Endotrichus) tricornatus Simon



Heterometrus (Chersonesometrus) kanaraensis (Pocock)



Isometrus (Closotrichus) sankeriensis Tikadar & Bastawade



Iomachus laeviceps malabarensis Pocock

Fishes of Biligiri Rangaswamy Temple Wildlife Sanctuary



Chela laubuca (Hamilton)



Salmostoma boopis Day



Amblypharyngodon microlepis (Bleeker)



Barilius gatensis (Val.)

Contd.



Danio malabaricus (Jerdon)



Rasbora caverii (Jerdon)



Rasbora daniconius (Hamilton)



Puntius bimaculatus (Bleeker)

Contd.



Puntius chola (Hamilton)



Puntius sophore (Hamilton)



Puntius conchonius (Hamilton)



Puntius melanostigma (Day)

Contd.



Garra mullya (Sykes)



Lepidocephalus thermalis (Val.)



Oreonectes (Indoreonectes) evezardi (Day)



Schistura denisoni mukambikaensis Menon



Schistura nilgiriensis Menon

Contd.



Aplocheilus blocki Arnold



Male



Female

Gambusia affinis (Baird & Girard)



Male



Female

Poecilia reticulata (Peters)



Chanda nama Hamilton

Contd.



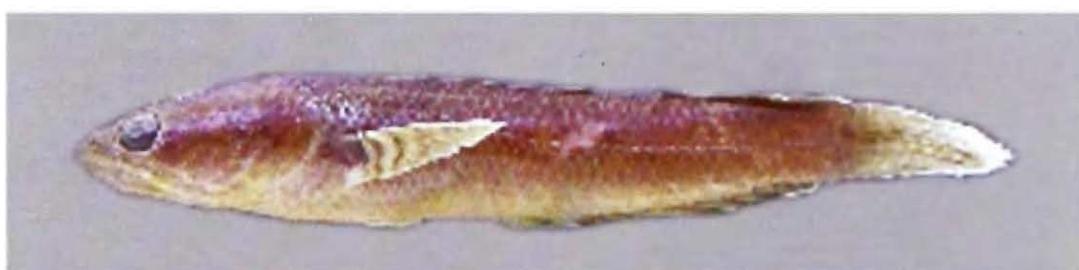
Parambassis ranga (Hamilton)



Oreochromis mossambica (Peters)



Glossogobius giuris (Hamilton)



Chanda orientalis (Schneider)

Amphibians of Biligiri Rangaswamy Temple Wildlife Sanctuary



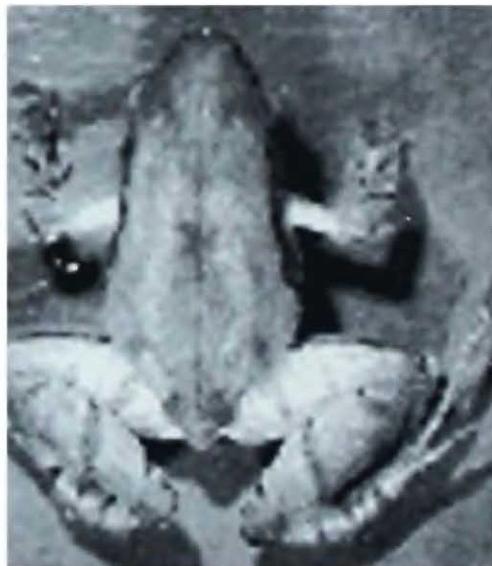
Bufo melanostictus Schneider



Microhyla ornata (Dumeril & Bibron)



Microhyla rubra (Jerdon)



Microhyla sholigari Dutta & Ray



Kaloula pulchra Gray



Micrixalus opisthorhodus (Gunther)

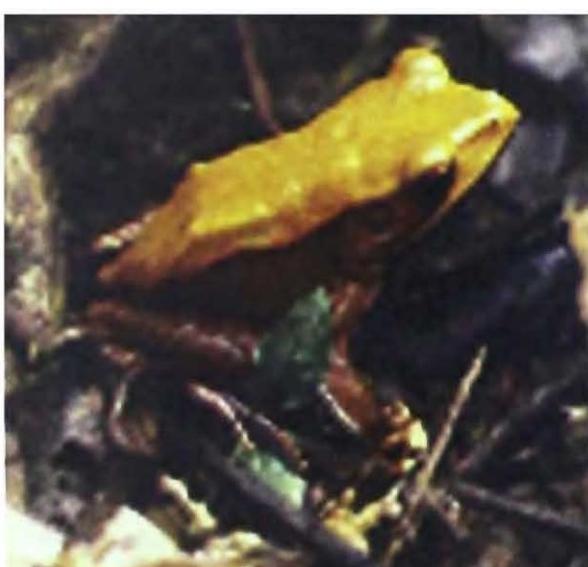
Contd.



Nyctibatrachus major Boulenger



Rana beddomii (Gunther)



Rana curtipes Jerdon



Rana cyanophlyctis Schneider



Contd.



Rana tigerina Daudin



Rana limnocharis Boie



Tomopterna breviceps (Schneider)



Philautus glandulosus (Jerdon)



Philautus leucorhinus (Lichtenstein and Martens)



Polypedates maculatus (Gray)

THIRUMALAI and KRISHNAN : *An Overview*

Reptiles of Biligiri Rangaswamy Temple Wildlife Sanctuary



Mammals of Biligiri Rangaswamy Temple Wildlife Sanctuary



Giant flying squirrel



Barking Deer



Elephant

Gaur



ROTIFERA

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INTRODUCTION

The plankton samples collected from Biligiri Rangaswamy Temple Hill sanctuary during the surveys undertaken in 1999 and 2000 were analysed. On the whole 17 plankton samples collected from 12 localities were analysed. Since there is no earlier information on the Rotifera of this sanctuary this will form the first report of this area.

MATERIAL AND METHODS

A plankton net of 100 μm mesh size and length of 1.0 m mounted on a 0.3 m dia. steel frame hauled by a 2.55 m long nylon rope was deployed to collect samples. Atleast three hauls have been made horizontally and diagonally across surface waters and the samples have been collected from the filter bucket. The samples have been preserved in 5% formalin.

SYSTEMATIC LIST OF THE EXAMINED TAXA

Phylum	ROTIFERA
Subclass	EUROTATORIA
Superorder	MONOGONONTA
Order	PLOIMIDA
Family	BRACHIONIDAE

1. *Brachionus calyciflorus f. borgerti* (Apstein)
2. *Brachionus forficula forficula* Wierzejski
3. *Keratella quadrata* (O. F. Muller)
4. *Keratella tropica* (Apstein)

Family ASPLANCHNIDAE

5. *Asplanchna brightwelli* Gosse

Order GNESIOTROCHA
Suborder FOSCULARIACEA
Family TESTUDINELLIDAE

6. *Testudinella patina* (Hermann)

Family FILINIDAE

7. *Filinia opoliensis* Zacharias

Family TROCHOSPHAERIDAE

8. *Horaella brehmi* Donner

SYSTEMATIC ACCOUNT

1. *Brachionus calyciflorus f. borgerti* (Apstein)

1907. *Brachionus amphiceros borgerti* Apstein, Zool. Jb. Abs. Syst., 25 : 211, figs. G. H.

1998. *Brachionus calyciflorus f. borgerti* (Apstein) : Sharma, Fauna of West Bengal : 358.

Material examined : 5 exs., 2.iv.99, G. Thirumalai, Kalani road, 5 exs., 22.xi.99, M.B. Raghunathan, K. Gudi.

Distribution : Andhra Pradesh, Orissa, Punjab, West Bengal.

Remarks : Median occipital spines longer than laterals and with saw-tooth like basis.

2. *Brachionus forficula forficula* Wierzejski

1891. *Brachionus forficula* Wierzejski, Bull. Soc. Zool. France, 16 : 51, fig. 3.

1998. *Brachionus forficula forficula* Wieizejski : Sharma, Fauna of West Bengal : 361.

Material examined : 5exs., 11.iv.2000, S. Krishnan, Pond near B.R. Hills.

Distribution : Andhra Pradesh, Gujarat, Orissa, Punjab, West Bengal.

Remarks : Lorica rigid, compressed dorsoventrally, anterior margin with four occipital spines.

3. *Keratella quadrata* (O. F. Muller)

1786. *Brachionus quadratus* Muller, p. 354, Havaniæ, I-LVI, : pl. 49, figs. 12, 13.

1998. *Keratella quadrata* (O. F. Muller) : Sharma, Fauna of West Bengal : 368.

Material examined : 5 exs., 11.iv.2000, S. Krishnan, Pond near B.R. Hills.

Distribution : Assam, Kashmir, Kerala, Tamilnadu, West Bengal.

Remarks : Lorica rectangular in outline with six anterior occipital spines.

4. *Keratella tropica* (Apstein)

1907. *Anurea valga f. tropica* Apstein, Zool. Jb. Abs. Syst., 25 : 210, fig. F.

1998. *Keratella tropica* (Apstein) : Sharma, Fauna of West Bengal : 369.

Material examined : 5 exs., 11.iv.2000, S. Krishnan., Pond near B.R. Hills.

Distribution : Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Kashmir, Kerala, Madyapradesh, Orissa, Punjab, Rajasthan, West Bengal.

Remarks : Lorica elongate oval with six anterior occipital spines.

5. *Asplanchna brightwelli* Gosse

1850. *Asplanchna brightwelli* Gosse, Ann. Mag. Nat Hist. Ser.2, 6 : 23.

1998. *Asplanchna brightwelli* Gosse : Sharma, Fauna of West Bengal : 428.

Material examined : 5 exs., 21.ii.99., S. Krishnan, Kadakkinagandi.

Distribution : Andhra Pradesh, Assam, Kashmir, Orissa, Punjab, West Bengal.

Remarks : Body transparent, thin, sacciform.

6. *Testudinella patina* (Hermann)

1783. *Brachionus patina* Hermann, Natur forscher. Halle, 19 : 48, Taf. 2., fig. 10.

1998. *Testudinella patina* (Hermann) : Sharma, Fauna of West Bengal : 439.

Material examined : 5 exs., 2.iv.99, G. Thirumalai, Kalani road.

Distribution : Andhra Pradesh, Assam, Gujarat, Kashmir, Orissa, Punjab, West Bengal.

Remarks : Lorica transparent, circular and flattened.

7. *Filinia opoliensis* (Zacharias)

1898. *Tetramastix opoliensis* Zacharias, Forschungster Biol. Stn. Zoo. Plon, 6 : 132, Taf. 1., figs. 6,7.

1998. *Filinia opoliensis* (Zacharias) : Sharma, Fauna of West Bengal : 441.

Material examined : 5 exs., 11.iv.2000., S. Krishnan, Pond near B. R. Hills.

Distribution : Assam, Gujarat, Madhya Pradesh, Orissa, Punjab, Rajasthan, West Bengal.

Remarks : Body long and cylindrical with anterior seta long and broad based.

8. *Horaella brehmi* Donner

1949. *Horaella brehmi* Donner, Hydrobiologia, 2 : 130-140, Abb. 1.a-b, 2b-c, 3a-c.

1998. *Hornella brehimi* Donner : Sharma, *Fauna of West Bengal* : 444.

Material examined : 5 exs., 21.ii.99., S. Krishnan, Kadakkinagandi.

Distribution : Bihar, Orissa, West Bengal.

Remarks : Body transparent, vesicular and broadly elliptical.

SUMMARY

Since the studies pertaining to Rotifera of Karnataka state are very limited reporting of 8 species from B.R.T. Hills sanctuary will be a valuable record of this group.

REFERENCES

- DHANAPATHI, M.V.S.S.S. 2000. Taxonomic notes on the Rotifers from India. (from 1889-2000). Indian Association of Aquatic Biologists (IAAB), Hyderabad, : 1-178.
- SHARMA, B. K. 1998. Freshwater Rotifers (Rotifera : Eurotatoria). *Fauna of West Bengal, State Fauna Series, 3*(Part-11) : 341-461. Zool. Surv. India.

MOLLUSCA

RAMAKRISHNA, S.C. MITRA and N.A. ARAVIND*

Zoological Survey of India, M-Block, New Alipore, Kolkata-700 053

INTRODUCTION

The report is based on the small lot of collections made from the Biligiri Rangaswamy Wildlife Sanctuary, Karnataka by the Southern Regional Station of ZSI, Chennai during 1999-2000 and ATREE, Bangalore, and made available to us for study. The classification followed here is after Subba Rao (1989).

SYSTEMATIC ACCOUNT

Phylum MOLLUSCA

Class GASTROPODA

Order MEGAGASTROPODA

Family VIVIPARIDAE

Genus *Bellamya* Jousseaume

1. *Bellamya dissimilis* (Mueller)

1774. *Nerita dissimilis* Mueller, *Hist. Verm. Test.*, 2 : 184 (Type locality not mentioned)

1989. *Bellamya dissimilis* : Subba Rao, Hand book : *Freshwater molluscs of India* : 48, Figs 64-67.

Material examined : (1) 1 ex. Near Check post, 2.1.1999 (2) 5 exs, Nallur, 8.5.2000, Coll. Dr. S. Krishnan.

Distribution : Widely distributed throughout India, occurring in all types of freshwater bodies.

Remarks : Shell rather small, narrow conically ovate, whorls 5-6, moderately convex,

** Ashoka Trust for Research in Ecology and the Environment (ATREE) #659, 5th A main, Hebbal, Bangalore-560 024

last whorl subangulate around periphery; aperture sub-circular with a black rim, operculum thick, circular. First record from the sanctuary.

Order BASOMMATOPHORA

Family LYMNAEIDAE

Genus *Lymnaea* Lamarck, 1799

Subgenus *Pseudosuccinea* Baker, 1908

2. *Lymnaea (Pseudosuccinea) luteola* Lamarck

1882. *Lymnaea luteola* Lamarck, *Hist. Nat. Anim. Sans. Vert.*, 6(2) : 160 (Type locality : Bengal)

Material examined : 12 exs., K. Gudikere, Jodikere, Basavana Annikere.

Distribution : Very widely distributed throughout India.

Remarks : Shell is thin and white, ovate with a narrow ovate aperture with large body whorl. Spire not very much pointed. This is a very ubiquitous species and it is not very habitat specific. Common in stagnant water bodies, ponds and tanks, marsh, reservoir, paddy fields, etc. Considered as pest to paddy and *Azolla* (Subba Rao, 1988).

3. *Lymnaea (Pseudosuccinea) luteola f. typica* Lamarck

1882. *Lymnaea luteola* Lamarck *Hist. Nat. Anim. Sans. Vert.*, 6(2) : 160 (Type locality : Bengal)

1989. *Lymnaea (Pseudosuccinea) luteola f typica* Subba Rao, *Handbook : Freshwater Molluscs of India* : 129, Figs. 275-276.

Material examined : (1) 4 ex. Duru guru, 29.2.1997 (2) 2 exs., Bhanuwadi, 19.2.1999 (3) 1 ex., Near Check post, 2.11.1999 (4) 3 exs, Nallur, 8.5.2000, Coll. Dr. S. Krishnan.

Distribution : Very widely distributed throughout India, mostly remain attached to aquatic vegetation near the surface water.

Remarks : Shell of moderate size, thin, glossy with a gradually tapering spire, whorls 5-6, last whorl large, inflated rather compressed laterally; aperture ovate, lip thin, columella twisted. First record from this Sanctuary.

Order BASOMMATOPHORA

Family PLANORBIDAE

Genus *Indoplanorbis* Annandale & Prashad, 1921

4. *Indoplanorbis exustus* (Deshayes)

1834. *Planorbis exustus* Deshayes, in Belanger, *Voy. Indes-Orientaleas*, : 417, pl. 1. Figs 11-13. (Type locality : Malabar coast).

1989. *Indoplanorbis exustus* Subba Rao, Handbook : *Freshwater Molluscs of India* : 142, Figs 326-327.

Material examined : (1) 5 ex. Duru guru, 29.2.1997 (2) 8 exs., Kombara Mathi, 26.2.1999 (3) 8 exs., Near Check post, 2.11.1998 (4) 11 exs, Hanakere, 29.11.1999 (5) 5 exs., Nallur, 8.5.2000, Coll. Dr. S. Krishnan.

Distribution : Abundantly occurs throughout the plains of India—in all types of freshwater accumulation, drains, ditches to large ponds and lakes.

Elsewhere : Bangladesh, Indonesia, Malaysia, Myanmer, Pakistan, Sri Lanka, Thailand, Vietnam.

Remarks : Shell depressedly coiled, large, thick, suture deeply impressed, aperture ear shaped, lip lightly thickened. First record from this Sanctuary. It is a known vector snail, serving as intermediate host of large number of trematode parasites.

Order MESOGASTROPODA

Family BITHYNIIDAE

Genus *Gabbia* Tryon

5. *Gabbia stenothyroides* (Dohrn)

1857. *Bythinia stenothyroides* Dohrn, Proc. zool. Soc. Lond., : 123

1989. Subba Rao : Handbook : *Freshwater Molluscs of India* : 77, Figs 143-144.

Material examined : 15 exs., Basavanagodu stream flowing through moist deciduous forest.

Distribution : Common species found throughout India. Reported from Goa, Pune, Nilgiris, South Arcot, Thiruchirapalli, Chennai.

Elsewhere : Sri Lanka.

Remarks : Shell ovate, number of whorls ranges from 4-5. Shell convex and smooth, body whorl proportionally larger, spire comparatively short and broadly conical, mouth contracted.

6. *Gabbia travancorica* (Benson)

1860. *Bithynia travancorica* Benson, Ann. Mag. nat. Hist., 3(6) : 259.

1989. Subba Rao : Handbook : *Freshwater Molluscs of India* : 78, Figs 145-146.

Material examined : 10 exs., Jodi kere, Basavana Anni kere.

Distribution : South India.

Remarks : Shell conically globose, 4 whorls, sutures impressed, imperforate, aperture oval, columellar margin ridge-like. Common in stagnant ponds, tanks and paddy fields.

SUMMARY

The material available for study included six species of common freshwater gastropods of cosmopolitan distribution. As already mentioned all six species are very widely distributed throughout India. Unfortunately a single shell of land snail collected was badly damaged in transit and could not be identified; apparently it belonged to *Cryptozona*, a common land snail genus represented by 7-8 species in Peninsular India. Incidentally, Peninsular India together with the Western Ghats has a very high rate of faunal diversity. More than 400 species of land molluscs are recorded from these areas with around 60% endemicity (Ramakrishna & Mitra, 2002). It is quite possible that the material collected from the Biligiri Rangasamy Wildlife Sanctuary is far from a true reflection of available molluscan fauna and further surveys may yield more number of species.

REFERENCES

- RAMAKRISHNA and S. C. MITRA. 2002. *Endemic land Molluscs of India*. Rec. zool. Surv. India, Occ. Paper No., 196 : 1-65, pls. 1-13.
- SUBBA RAO, N. V. 1989. Handbook : *Freshwater molluscs of India*, Zool. Surv. India, Kolkata, : XIII+289, 636 figs.

CRUSTACEA : CLADOCERA

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INTRODUCTION

The plankton samples collected from Biligiri Rangaswamy Temple Hills Sanctuary during the surveys undertaken in February–March 1999 (Dr. S. Krishnan), April, 1999 (Dr. G. Thirumalai) November 1999 (Dr. M.B. Raghunathan) and during April, 2000 (Dr. S. Krishnan) were analysed. Since there is no earlier information on the Cladocera of this sanctuary, this will form the first report from this sanctuary.

With reference to the studies on the Cladocera of Karnataka State, Patil and Gouder (1982) studied the Cladocera of Dharwad and Raghunathan (1988) made studies on the Cladocera of Coorg district and 14 species were recorded. Raghunathan and Rane (2001) made studies on the Cladocera of Nilgiri Biosphere Reserve and from Karnataka area 12 species were recorded.

MATERIAL AND METHODS

A plankton net of 100 μm mesh size and length of 1.0 m mounted on a 0.3 m dia. steel frame hauled by a 2.55 m long nylon rope was deployed to collect samples. Atleast four hauls have been made horizontally and diagonally across surface waters and the samples have been collected from the filter bucket. The samples have been preserved in 5% formalin.

RESULTS

During the study, the following species of Cladocera were recorded.

Order CLADOCERA

Family SIDIDAE

1. *Diaphanosoma excisum* Sars
2. *Diaphanosoma sarsi* Richard

Family DAPNIIDAE

3. *Ceriodaphnia cornuta* Sars
4. *Simocephalus vetulus* (O.F. Muller)

Family MOINIDAE

5. *Moina micrura* Kurz.

Family CHYDORIDAE

6. *Chydorus ventricosus* Daday

1. *Diaphanosoma excisum* Sars

1885. *Diaphanosoma excisum* Sars, *Norske. Vidensk. Selsk. Forhandl. Christiania* : 13-18, pl. 2, figs. 1-3

2001. *Diaphanosoma excisum* Sars : Raghunathan and Rane, *Fauna of Conservation Area Series, 11* : 31

Material examined : 5 exs., Banuwadi, 19.ii.99; 5 exs., 25.ii.99; 5 exs., B.R. Hills, 1.iii.99; 5 exs., K. Gudi, 22.xi.99.

Distribution : Bihar, Rajasthan, Tamil Nadu, West Bengal.

Remarks : Post abdomen narrow with setules.

2. *Diaphanosoma sarsi* Richard

1894. *Diaphanosoma sarsi* Richard, *Ann. Mus. Civico. Stor. Nat. Genova.*, : 365, pl. 15, figs. 1-8

2001. *Diaphanosoma sarsi* Richard : Raghunathan and Rane, *Fauna of Conservation Area Series, 11* : 32

Material examined : 5 exs., Pond near B.R. Hills, 11.iv.2000.

Distribution : Bihar, Meghalaya, Rajasthan, Tamil Nadu and West Bengal.

Remarks : Postero-ventral corner of carapace obliquely cut off with series of small denticles.

3. *Ceriodaphnia cornuta* Sars

1885. *Ceriodaphnia cornuta* Sars, *Norske. Vidensk. Selsk. Forhandl. Christiania* : 26-28, pl. 5. figs. 1-3

2001. *Ceriodaphnia cornuta* Sars : Raghunathan and Rane, *Fauna of Conservation Area Series, 11* : 32

Material examined : 5 exs., Kalani Road, 2.iv.99, 5 exs., Sebinakare, 4.iv.99, 5.exs., B.Hills, 22.xi.99.

Distribution : Bihar, Kerala, Meghalaya, Rajasthan, Tamil Nadu and West Bengal.

Remarks : Head small, depressed and separated from body by a distinct ocular depression.

4. *Simocephalus vetulus* (O.F. Muller)

1776. *Daphnia vetula*, O.F. Muller, *Havniae* : 199, No. 2399

2001. *Simocephalus vetulus* (O. F. Muller) : Raghunathan and Rane, *Fauna of Conservation Area Series*, 11 : 33

Material examined : 5 exs., Duruguru, 26.ii.99.

Distribution : Karnataka, Kashmir, Punjab, Rajasthan, Tamil Nadu and West Bengal.

Remarks : Head small, prominent, rounded in front with very broad post abdomen.

5. *Moina micrura*, Kurz

1820. *Monoculus rectirostris* Jurine, *Histoire des Monocles* : 134-145, pl. 13, fig. 3-4.

2001. *Moina micrura* Kurz : Raghunathan and Rane, *Fauna of Conservation Area Series*, 11 : 33.

Material examined : 5 exs., Kalani Road, 2.iv.99 ; 5 exs., Sebinakare, 4.iv.99.

Distribution : Karnataka, Rajasthan, Tamil Nadu and West Bengal.

Remarks : Head large, extended in antero-ventral direction and with well developed supra-ocular depression.

6. *Chydorus ventricosus* Daday

1898. *Chydorus ventricosus* Daday, *Termes. Fuzetek.*, : 28-29, figs. 10a-d.

2001. *Chydorus ventricosus* Daday : Raghunathan and Rane, *Fauna of Conservation Area Series*, 11 : 34

Material examined : 5 exs., Banuwadi, 19.ii.99; 5 exs., Kadakkinagandi, 21.ii.99; 5 exs., Kalani road, 2.iv.99.

Distribution : Gujarat, Rajasthan, Tamil Nadu.

Remarks : Ventral margin strongly bulged in middle with 11-15 long setae on antero-ventral margin.

SUMMARY

Among the six species recorded from B.R.T. Hills Sanctuary three species namely *Diaphanosoma excisum*, *Ceriodaphnia cornuta* and *Moina micrura* are very common. The other species namely *Diaphanosoma sarsi*, *Simocephalus vetulus* and *Chydorus ventricosus* are not frequently seen in the samples.

REFERENCES

- GEORGE MICHAEL, R. and SHARMA, B. K. 1988. Fauna of India and adjacent countries. Indian Cladocera (Crustacea : Branchiopoda : Cladocera). *Zoological Survey of India*, Calcutta : 262.
- PATIL, C. S., and GOUDER, B.Y.M. 1982. Freshwater fauna of Dharwad (India) Cladocera. *Jour. Karanatak Sci.*, 27 : 115-126.
- RAGHUNATHAN, M. B. 1988. Cladocera (Crustacea) of Coorg district, Karnataka. *Geobios new Reports*, 7 : 163.
- RAGHUNATHAN, M.B. and RANE, P.D. 2001. Studies on Cladocera (Crustacea) In : *Fauna of Nilgiri Biosphere Reserve, Fauna of Conservation Area Series*, 11 : 31-37.

CRUSTACEA : DECAPODA : GECARCINUCIDAE (Crabs)

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INTRODUCTION

The Gecarcinucid crabs predominantly inhabiting fresh water habitat are found in both lotic and lentic waters, venturing to considerable elevations. Their distribution patterns vary according to seasons and surface water temperature. A cursory look into literature indicates paucity of information leaving us to depend more on classical work by Wood-Mason (1871), Rathbun (1904-1906), Alcock (1910). Extension of information base by Chopra and Tiwari (1947), Dutta (1987), Ghosh and Ghatak (1999-2000) serves limited purpose. There are several questions remaining unresolved in the taxonomy, systematics and distribution of Gecarcinucid crabs in India.

Bott (1970) in his revisionary work changed the classification of Brachyuran crabs and established the fresh water crabs of India under the family Gecarcinidae. We follow the classification of Bott (1970).

In order to initiate inventorisation process of biologically protected areas, this work has been undertaken in the Biligiri Rangaswamy Temple Wildlife Sanctuary in Karnataka State. The material has been collected by four surveys spread over a period of two years. Altogether 133 examples belonging to three species accommodated under two genera are dealt here.

SYSTEMATIC LIST

Class CRUSTACEA

Order DECAPODA

Infraorder BRACHYURA

Family GECARCINUCIDAE

Genus *Barytelphusa* Alcock 1909

1. *Barytelphusa (Barytelphusa) cunicularis* (Westwood 1836)

2. *Barytelphusa (Barytelphusa) guerini* (Milne-Edwards 1853)
Genus *Spiralothelphusa* Bott 1968
3. *Spiralothelphusa hydrodroma* (Herbst 1794)

SYSTEMATIC ACCOUNT

Genus *Barytelphusa* Alcock 1909

1. *Barytelphusa (Barytelphusa) cunicularis* (Westwood 1836)

1836. *Thelphusa cunicularis* Westwood, in Sykes & Westwood, *Trans. Entom. Soc. London*, 1 : 183, T. 19.
1910. *Paratelphusa (Barytelphusa) jacquemontii* Alcock, *Cat. Ind. Decap. Crust. Ind. Mus.*, 1(2) : 79 fig. 55.
1910. *Paratelphusa (Barytelphusa) lamellifrons* Alcock, *Cat. Ind. Decap. Crust. Ind. Mus.*, 1(2) : 82, fig. 18.
1910. *Paratelphusa (Barytelphusa) pulvinata* Alcock, *Cat. Ind. Decap. Crust. Ind. Mus.*, 1(2) : 86, fig. 21.
1970. *Barytelphusa (Barytelphusa) cunicularis* Bott., *Abh. Senckenb. Natur. Ges.* No., 526 : 31.

Material examined : 2 exs., Kolar road, BRT. WLS, Karnataka, 2.ii.1999, G. Thirumalai; 5 exs., Honametti Bedaguli, BRTWLS, Karnataka, 20.ii.1999, S. Krishnan; 3 exs., Basavangodu, BRT. WLS, Karnataka, 20.ii.1999, S. Krishnan; 14 exs., Kadakkinagandi, BRTWLS, Karnataka, 21.ii.1999, S. Krishnan; 25 exs., K.Gudi, BRTWLS, Karnataka, 24.ii.1999, S.Krishnan; 7 exs., Hanakere, BRTWLS, Karnataka, 25.ii.1999, S. Krishnan; 4 exs., Basavangodu, 28.ii.1999, S.Krishnan; 7 exs., Hanakere, BRTWLS 25.ii.1999, S.Krishnan; 4 exs., Basavangodu, BRTWLS, 3.iv.1999, G.Thirumalai; 14 exs., Biligiri Rangaswamy Temple, 22.xi.1999, M.B. Raghunathan; 4 exs., BRTWLS., Karnataka, 20.ii.2000, G. Thirumalai; 2 exs., Doddasempige, BRTWLS, Karnataka, 2.iii.2000, G. Thirumalai; 8 exs., K. Gudi, BRTWLS, Karnataka, 7.iv.2000, S. Krishnan.

Distribution : India : Assam, Andhra Pradesh, Bihar, Karnataka, Kerla, Madhya Pradesh, Maharashtra, Tamil Nadu and Uttar Pradesh.

Remarks : This is the first record of occurrence in the BRTWLS.

2. *Barytelphusa (Barytelphusa) guerini* (Milne-Edwards 1853)

1853. *Thelphusa guerini* Milne-Edwards, *Ann. Sci. Nat. Zool.*, 20(3) : 210
1910. *Paratelphusa (Barytelphusa) guerini* Alcock, *Cat. Ind. Decap. Crust. Ind. Mus.*, 1(2) : 87, fig. 57.
1970. *Barytelphusa (Barytelphusa) guerini* Bott., *Abh. Senckenb. Natur. Ges.* No., 526 : 33.

Material examined : 2 exs., Kolar Road, 2. ii.1999, G. Thirumalai; 3 exs., Honametti

Bedaguli, 20.ii.1999, S. Krishnan; 3 exs., Biligiri Rangaswamy Temple Hills, 1.iii.1999, S. Krishnan; 2. exs., Basavanagodu, 3.iv.1999, G. Thirumalai; 2.exs., Biligiri Rangaswamy Temple Hills, 20.ii.2000, G. Thirumalai.

Distribution : India : Andhra Pradesh; Karnataka; Tamil Nadu

Remarks : This is the first record of occurrence in Biligiri Rangaswamy Temple Wildlife Sanctuary.

Genus *Spiralothelphusa* Bott 1968

3. *Spiralothelphusa hydrodroma* (Herbst 1794)

1794. *Cancer hydrodromus* Herbst, *Naturgesch. Krabben und Krebse*, 2 : 164, T. 41 F. 2.

1910. *Paratelphusa (Oziotelphusa) hydrodromus* Alcock, *Cat. Ind., Decap. Crust. Ind. Mus.*, 1(2) : 97, fig. 60.

1970. *Spiralothelphusa hydrodroma* Bott., *Abh. Senckenb. Natur. Ges.* No., 526 : 97.

Dingnosis : Carapace strongly convex, cervical groove distinct but appears superficial; it disappears behind the post-orbital crests, orbit broad. External orbital tooth blunt and not separated by a gap from the lower margin of the orbit. The antero-lateral borders of carapace, strongly convex, cristiform and smooth, whereas the postero-lateral, borders ill defined. Three terminal segments of the male abdomen are slightly narrower in comparison to the basal segment.

Material examined : 1ex., Attubuthapura, Biligiri Rangaswamy Temple Wildlife Sanctuary., Karnataka, 25.ii.2000, G.Thirumalai.

Distribution : India : Andhra Pradesh, Kerala, Pondicherry, Tamil Nadu, Uttar Pradesh, West Bengal.

Remarks : This is the first record of occurrence in Biligiri Rangaswamy Temple Wildlife Sanctuary.

SUMMARY

Three species under two genera of the Gecarcinucid crab have been dealt within this report. The systematic accounts with synonymy, material examined and their localities (Table-I) with general distribution are also recorded.

TABLE - I

Name of the localities of Biligiri Rangaswamy Temple Wildlife Sanctuary :

- | | |
|-------------------------------------|-------------------|
| 1. Attubuthapura | 2. Basavanagodu |
| 3. Biligiri Rangaswamy Temple Hills | 4. Doddasempige |
| 5. Honametti Bedaguli | 6. K. Gudi |
| 7. Hanakere | 8. Kadakkinagandi |
| 9. Kolar Road | |

Within the BRTWLS *B. (B.) cunicularis* had been found predominantly (8 stations), followed by *B. (B.) guerini* (4 stations) and followed by *S. hydrodroma* (one station). Interestingly all the three species occur in Tamil Nadu also.

ACKNOWLEDGEMENT

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REFERENCES

- ALCOCK. 1910. The Indian Freshwater Crabs-Potamonidae. *Cat. Ind. Decap. Crust. Ind. Mus.*, 1(2) : 1-135, pl. 1-14.
- BOTT, R. 1970. Die Siibwasser Krabben Von Europa, Asien, Australien under ihre stamesgeschichte (Crustacean : Decapoda). *Abh. Senckenb. natur. Ges.* No., 526 : 1-338
- CHOPRA, B.N. and TIWARI, K.K. 1947. Decapoda Crustacea of Patna State, Orissa. *Rec. Indian Mus.*, 45 : 213-224.
- DUTTA, N.K. 1983. Studies on the systematics and distribution of crabs in Assam. *J. Bombay nat. Hist. Soc.*, 80(3) : 539-548.
- GHOSH, H.C. and Ghatak, S.S. 1999. Crustacea : Decapoda : Potamonidae. *Fauna of Meghalaya, State Fauna Series*, 4(Part-9) : 569-576. *Zool. Surv. India*.
- GHOSH, H. C. and GHATAK, S.S. 2000. Crustacea : Decapoda : Potamonidae. *Fauna of Tripura, State Fauna Series*, 7(Part-4) : 273-275. *Zool. Surv. India*.
- RATHBUN, M.J. 1904. Les Crabs D'eau Douce. *Nouv. Archiv. Mus. Hist. Nat.*, Paris, 6(4) : 225-312, pl. 9-18.
- RATHBUN, M.J. 1905. Les Crabs D'eau Douce. *Nouv. Archiv. Mus. Hist. Nat.*, Paris, 7(4) : 159-323, pl.12-22.
- RATHBUN, M.J. 1906. Les Crabs D'eau Douce. *Nouv. Archiv. Mus. Hist. Nat.*, Paris, 8(4) : 33-122.
- WOOD-MASON, J. 1871. Contribution to the Indian Carcinology. Part-I on Indian and Malayan Telphusidae. *J. Asiatic. Society Bengal*, 40 : 194-196.

INSECTA : ODONATA

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INTRODUCTION

Odonates (damselflies and dragonflies) are predaceous, hemimetabolous insects. They are always found near water bodies. Their larvae are aquatic and carnivorous. Economically they are of great importance in destroying noxious flies, mosquitoes and small moths, which are considered pests. Besides, their larvae are bio-indicators of aquatic pollution.

Our knowledge on the odonate fauna of Karnataka is practically confined to the work of Fraser (1933-1936), mostly from the Coorg district. The present paper forms the first report of the odonate fauna occurring in the Biligiri Rangaswamy Temple Wildlife Sanctuary. 8 species of Odonata under 7 genera are dealt with here, the details of which are presented below. The specimens are deposited in the faunal depository of the Southern Regional Station, Zoological Survey of India, Chennai.

The nomenclature followed here is after Prasad and Varshney (1995).

SYSTEMATIC LIST

Order ODONATA

Suborder ZYGOPTERA

Superfamily COENAGRIONOIDEA

Family COENAGRIONIDAE

Subfamily PSEUDAGRIONINAE

1. *Pseudagrion rubriceps rubriceps* (Selys)

Subfamily ISCHNURINAE

2. *Aciagrion occidentale* Laidlaw

3. *Ischnura aurora aurora* (Brauer)

Subfamily AGRIOCNEMIDINAE

4. *Agriocnemis pygmaea* (Rambur)

Superfamily CALOPTERYGOIDEA

Family CALOPTERYGIDAE

5. *Libellago lineata indica* (Fraser)

Suborder ANISOPTERA

Superfamily LIBELLULOIDEA

Family LIBELLULIDAE

Subfamily LIBELLULINAE

6. *Orthetrum pruinosum neglectum* (Rambur)7. *Orthetrum sabina sabina* (Drury)

Subfamily SYMPETRINAE

8. *Diplacodes trivialis* (Rambur)

SYSTEMATIC ACCOUNT

1. *Pseudagrion rubriceps rubriceps* (Selys)*Pseudagrion rubriceps* Selys, Bull. Acad. Belg. (2) vol. xiii, p. 510 (1876), Kirby, Cat. Odon., : 153 (1890).

Diagnosis : In male, face, frons and vertex reddish orange in colour; thorax, olivaceous green with a golden tinge, sides azure-blue, mid-dorsal carina finely black, 2 thick black stripes running close to and parallel with mid-dorsal carina on each side; in female, face, frons and vertex dark olivaceous in colour; posterior lobe of prothorax with 2 forwardly directed spines at base; thorax dull bluish green on dorsum.

Material examined : 1 Male, Budipadaka, 18-ii-1999; 1 Male, Bhanuwadi, 19-ii-1999, Coll. S. Krishnan.

Distribution : Throughout India.

Habits and Habitat : Breeds in grassy banks of small streams.

Status : Male specimens are common, but females are rarely seen except during breeding time.

2. *Aciagrion occidentale* Laidlaw

Aciagrion hisopa (Selys)? Race *occidentalis* Laid, Rec. Indian. Mus., Vol. xvi, : 186 (1919);

Aciagrion occidentalis Fras., J. Bombay. nat. Hist. Soc. vol., xxix, : 749 (1923).

Diagnosis : Very small, slender species. Thorax and abdomen pale-blue coloured and with black markings; wings with pterostigma diamond-shaped, that of fore-wing nearly double the size of the hind-wing; female similar to male, more robust, pale yellow coloured on face and occipital stripes.

Material examined : 1 Female, Haralukadu, 3-iv-1999, Coll. G. Thirumalai.

Distribution : South India and Sri Lanka.

Habits and Habitat : A migratory species breeding in marshes.

Status : Common.

3. *Ischnura aurora aurora* (Brauer)

Agrion delicatum Hagen, verh. zool. -Bot. Ges. Wien, vol. viii, : 479 (1858), *Agrion aurora* Brauer, verh. zool. -Bot. Ges. Wien, vol. xv, p. 510 (1865); *id*, Reise 'Novara' : 52 (1866).

Diagnosis : Wings hyaline; pterostigma differing in the fore-and hind-wings, that of fore-wings in male slightly broader than long, kite-shaped, rose-red for its proximal half, hyaline for the distal; in the hind-wing, pterostigma much smaller, about half the size, uniform pale gray, almost colourless; in female, pterostigma palest pink and shaped similar to that of the male.

Material examined : 1 Male, Kombaramathi, 26-ii-1999, Coll. S. Krishnan.

Distribution : Widely distributed throughout India.

Habits and Habitat : A bivoltine species, breeding in temporary monsoon ponds and slow running streams.

Status : Common.

4. *Agriocnemis pygmaea* (Rambur)

Agrion pygmaeum Ramb., Ins. Nevrop., : 278 (1842); Brauer, verh. zool. -bot. Ges. Wien, vol. XIV, : 161 (1864); *id*, Reise, 'Novara', : 103 (1866).

Diagnosis : Labrum metallic blue; clypeus, genae and frons pale apple-green; thorax black dorsally and apple-green laterally; pterostigma pale yellow in fore-wings, black in hind-wings; abdominal segments 1 to 6 pale greenish-yellow with black markings and segments 7 to 10 brick red in males. Female more robust than male and exhibit a number of polychromatic forms.

Material examined : 7 males, 1 female, Budipadaka, 18-ii-1999; 11 males, 7 females, Kombaramathi, 26-ii-1999; 1 male, B.R.T. Hills, Krishnakette, 11-iv-2000, Coll. S. Krishnan; 1 male, Road to Sabinakere, 4-iv-1999, Coll. G. Thirumalai.

Distribution : Throughout the Oriental Region.

Habits and Habitat : Always found on plants near streams and ponds; breeding occurs in temporary ponds and slow-running marshy streams.

Status : Very common.

5. *Libellago lineata indica* (Fraser)

Micromerus lineatus Fraser, Rec. Indian. Mus. vol. xvi, : 197, 198, (1919), (larva); Laidlaw, Spolia zeylanica, vol. xii, : 354, 355 (1924), *Micromerus lineatus indica* Fraser, J. Bombay nat. Hist. Soc. xxxii, : 686, 687 (1928).

Diagnosis : Small insect, black with yellow markings on the body; fore-wings black tipped in male, pterostigma absent in fore-wings, 6 antenodal nervures present on all wings; female more robust than male, markings similar, but the yellow markings more extensive, wings hyaline, pterostigma present in all wings, 6 to 7 antenodal nervures present.

Material examined : 1 male, Budipadaka, 18-ii-1999, Coll. S. Krishnan.

Distribution : South India.

Habits and Habitat : Usually found on blades of grass near streams.

Status : Uncommon.

6. *Orthetrum pruinosum neglectum* (Rambur)

Libellula neglecta Rambur, Ins. Nevrop. P. 86 (1842).

Diagnosis : Frons dark brown or black above; thorax brown; abdomen purplish red in males; in female, frons pale olivaceous brown; abdomen dull ochreous.

Material examined : 1 male, Kenkere, 25-ii-1999, Coll. S. Krishnan; 1 male, Kalani road, 2- iv-1999, Coll. G. Thirumalai.

Distribution : Throughout India.

Habits and Habitat : Always found near water or on plants in and around ponds. Breeds in tanks, pools etc.

Status : Common.

7. *Orthetrum sabina sabina* (Drury)

Libellula sabina Drury, III. Exot. Ins. vol. i, : 114, 115 (1770), *Orthetrum sabina* Kirby, Trans. Zool. Soc. Lond. Vol. xii, : 302 (1889).

Diagnosis : Abdominal segments 1 to 3 enormously swollen dorsoventrally and laterally and the remaining segments compressed laterally to the end; thorax and abdomen greenish yellow marked with black; female similar to male both in colour and shape of abdomen.

Material examined : 1 female, K. Gudi, Chenthakodi, 8-iv-2000, Coll. S. Krishnan.

Distribution : Throughout India.

Habits and Habitat : This is the most predaceous dragonfly found in India. Breeds in still waters and are usually found near ponds.

Status : Very common.

8. *Diplacodes trivialis* (Rambur)

Libellula trivialis Rambur, *Ins. Nevrop.*, : 115 (1842); *Diplacodes trivialis* Karsch, *Ent. Nachr.* Vol. xvii, : 246 (1891).

Diagnosis : Thorax and abdomen greenish-yellow with black markings in sub-adults; in adults, thorax and abdomen pruinosed blue; wings hyaline; anal appendages cream coloured; female resembles the sub-adult male in colour and markings.

Material examined : 1 female, Komaramathi, 26-ii-1999, Coll. S. Krishnan.

Distribution : Throughout India.

Habits and Habitat : Found near water bodies and footpaths in open spaces. It breeds in swampy areas and lakes.

Status : One of the most common dragonflies found in India.

REFERENCES

- FRASER, F.C. 1933. *Fauna of British India, including Ceylon and Burma, Odonata*, vol. 1 : 1+423. Publ; Taylor & Francis, London.
- FRASER, F.C. 1934. *Fauna of British India, including Ceylon and Burma, Odonata*, vol. 2 : 1+398. Publ; Taylor & Francis, London.
- FRASER, F.C. 1936. *Fauna of British India, including Ceylon and Burma, Odonata*, vol. 3 : 1+461. Publ; Taylor & Francis, London.
- PRASAD, M. and VARSHNEY, R.K. 1995. A checklist of the Odonata of India, including data on larval studies. *Oriental Ins.*, 29 : 385-428.

INSECTA : ORTHOPTERA

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INTRODUCTION

It is an attempt to study the Orthopteran species collected from Biligiri Rangaswamy Temple Wildlife Sanctuary, Karnataka.

There is no earlier record of orthopteran fauna available from Biligiri Rangaswamy Temple Wildlife Sanctuary; all the species in the present study are recorded for the first time from that area. Details of synonyms, diagnostic characters and *Distributions* have been given.

SYSTEMATIC LIST

Order ORTHOPTERA

Suborder CAELIFERA

Superfamily ACRIDOIDEA

Family PYRGOMORPHIDAE

Genus *Atractomorpha* Saussure, 1861

1. *Atractomorpha crenulata* (Fabricius)

Genus *Neo-orthacris* Kevan & Singh, 1964

2. *Neo-orthacris acuticeps nilgiriensis* (Bolivar)

Genus *Zygodactylaeoba* Bolivar, 1902

3. *Zygodactylaeoba sinuaticollis* Bolivar

Family ACRIDIDAE

Subfamily GOMPHOCERINAE

Genus *Leva* Bolivar, 1902

4. *Leva indica* (Bolivar)

Subfamily ACRIDINAE

Genus *Acrida* Linnaeus, 1758

- 5.
- Acrida exaltata*
- (Walker)

Subfamily OEDIPODINAE

Genus *Dittopternis* Saussure, 1884

- 6.
- Dittopternis venusta*
- (Walker)

Genus *Trilophidia* Stal, 1873

- 7.
- Trilophidia annulata*
- (Thunberg)

Subfamily HEMIACRIDINAE

Genus *Spathosternum* Krauss, 1877

- 8.
- Spathosternum prasiniferum prasiniferum*
- (Walker)

Genus *Oxya* Serville, 1831

- 9.
- Oxya nitidula*
- (Walker)

Family TETRIGIDAE

Subfamily SCELIMENINAE

Genus *Thoradonta* Hancock, 1908

- 10.
- Thoradonta pruthii*
- Gunther

Subfamily Tetricinae

Genus *Paratettix* Bolivar, 1887

- 11.
- Paratettix cingalensis*
- (Walker)

Genus *Euparatettix* Hancock, 1904

- 12.
- Euparatettix tennius*
- Hancock

Genus *Hedotettix* Bolivar, 1887

- 13.
- Hedotettix costatus*
- Hancock

Superfamily GRYLLOIDEA

Family GRYLLIDAE

Subfamily GRYLLINAE

Genus *Gryllopsis* Chopard, 1928

- 14.
- Gryllopsis furcata*
- (Saussure)

Genus *Gryllodes* Saussure, 1874

- 15.
- Gryllodes sigillatus*
- (Walker)

Genus *Gryllus* Linnaeus, 1758

- 16.
- Gryllus bimaculatus*
- De Geer

Superfamily TETTIGONIOIDEA
 Family TETTIGONIIDAE
 Subfamily PHANEROPTERINAE
 Genus *Letana* Walker, 1869

17. *Letana* sp.

SYSTEMATIC ACCOUNT

1. *Atractomorpha crenulata* (Fabricius)

1793. *Truxalis crenulatus* Fabricius, *Ent. Syst.*, 2 : 28
 1861. *Atractomorpha crenulata* Saussure, *Annls. Soc. Ent. France*, 4 : 475.
 1969. *Atractomorpha crenulata* Kevan & Chen, *Zool. J. Linn. Soc.*, 48 : 187.

Diagnostic characters : Body medium and slender; fastigium of vertex shorter; lateral pronotal lobes with distinct membranous area, specially in females; tegmina pointed, extending one-fourth of their length beyond the hind femora; hind wings normally tyrian pink to light mallow purple at base.

Material examined : 1♂, 1♀, Biligiri Rangaswamy Temple Wildlife Sanctuary, 27.ii.1999, coll. S. Krishnan

Distribution : India : Throughout.

Elsewhere : Bangladesh, Malaya, Myanmar, Pakistan, Sri Lanka, N. W. Sumatra, Thailand and S. Vietnam.

2. *Neoorthacris acuticeps nilgiriensis* (Bolivar)

1902. *Orthacris acuticeps* Bolivar, *Ann. Soc. Ent. France*, 70 : 608.
 1964. *Neoorthacris acuticeps nilgiriensis* (Bolivar) : Kevan & Singh, *Entomologist*, 97 : 173.

Diagnostic characters : Body elongate; frons straight in profile; side of the body with a distinct broad, black band bordered both above and below by much narrower yellow stripes.

Material examined : 2♂, 1♂, 1 nymph, Biligiri Rangaswamy Temple Wildlife Sanctuary, Doddasampige, 2. iii. 2000, coll. G. Thirumalai.

Distribution : India : Andhra Pradesh, Karnataka, Orissa and Tamilnadu.

3. *Zygodactylaeoba sinuaticollis* Bolivar

1902. *Zygodactylaeoba sinuaticollis* Bolivar, *Annls. Soc. Ent. France*, 70 : 591.

Diagnostic characters : Body elongate; size small; head not ascending; frontal ridge in

profile; situated between the median ocellus and the antennae; elytra with lateral pad; colour brown.

Material examined : 1♂, 2♀, Biligiri Rangaswamy Temple Wildlife Sanctuary, 18.ii.1999, Coll. S. Krishnan.

Distribution : India : Andhra Pradesh, Karnataka and Tamilnadu.

4. *Leva indica* (Bolivar)

1902. *Gymnobothis indicus* Bolivar, *Annls. Soc. Ent. France*, 70 : 596.

1914. *Leva indica* Bolivar, *Trab. Mus. Nac. Cienc. Nat. Madr.*, 20 : 64.

Diagnostic characters : Small size; fastigium angularly produced; inferior foveolae indistinct; dorsum of pronotum constricted; median carina of pronotum distinct, lateral carinae parallel in prozona and divergent in metazona.

Material examined : 3♂, 1♀, Budipaduga, 26.ii.2000, Coll. Dr. G. Thirumalai; 2♂, Biligiri Rangaswamy Temple Hills, Gombaekalpodu, 9.iv.2000, Coll. S. Krishnan

Distribution : India : Bihar, Delhi, Karnataka, Madhya Pradesh, Orissa, Tripura and West Bengal.

Elsewhere : Sri Lanka.

5. *Acrida exaltata* (Walker)

1859. *Truxalis exaltata* Walker, *Ann. Mag. Nat. Hist.*, 3(4) : 222.

1954. *Acrida exaltata* Dirsh, *Bull. Soc. Found. Ent.*, 38 : 149.

Diagnostic characters : Medium size; head conically ascending, basal part narrow, fastigium of vertex broad, laminate and truncate; transverse sulcus of pronotum placed about the middle of disc; hind femora without any peg like structure in inner surface.

Material examined : 1♂, K. gudi, 24.ii.1999, Coll. S. Krishnan; 1♂, Biligiri Rangaswamy Temple Hills, Krishnankatte, 11.iv.2000, coll. S. Krishnan.

Distribution : India : Widely distributed.

Elsewhere : Afghanistan; Aden; Arabia; Pakistan; Sri Lanka; S. E. Tibet and Yemen.

6. *Dittopternis venusta* (Walker)

1870. *Oedipoda venusta* Walker, *Cat. Derm. Salt. Brit. Mus.*, 4 : 740.

1914. *Dittopternis venusta* Kirby, *Fauna Brit. India, Orthopt.* : 140.

Diagnostic characters : Small size; pronotum rugose, granulated and strongly carinated, cut by principal sulcus before the middle, obtusely angulated behind; tegmina with the

basal half brown and with a large yellow blotch; wings yellow at base, with a broad suffused blackish band behind; hind tibiae black at base, followed by a yellow band, then blue.

Material examined : 1♂, 1♀, Biligiri Rangaswamy Temple Hills, Gambaekalpodu, 9.iv.2000, Coll. S. Krishnan.

Distribution : India : Karnataka, Madhya Pradesh, Meghalaya, Orissa, West Bengal.

Elsewhere : Sri Lanka.

7. *Trilophidia annulata* (Thunberg)

1832. *Gryllus annulatus* Thunberg, Mem. Acad. Sci. St. Petersb., 5 : 234.

1914. *Trilophidia annulata* Hollis, Trans. R. ent. Soc. Lond., 117(8) : 235.

Diagnostic characters : Small size; pronotum rugose, with a high median carina, forming two teeth in front, and with lateral carinae; tegmina grey, sometimes with two indistinct brown bands; hind tibiae with a pale band towards the base and with a slight pale band beyond the middle.

Material examined : 1♂, Bhanuvadi, 19.ii.1999, Coll. S. Krishnan; 1♀, Duruguru, 26.ii.1999, coll. S. Krishnan; 1♂, Budipaduga, 28.ii.2002.

Distribution : India (Widely distributed).

Elsewhere : Bangladesh; Borneo; Japan; Java; Korea; Malaya; Mongolia; Myanmar; Pakistan; Sarawak; Singapore; Sri Lanka; Sumatra; Taiwan and Thailand.

8. *Spathosternum prasiniferum prasiniferum* (Walker)

1871. *Heteracris prasinifera* Walker, Cat. Derm. Salt. Brit. Mus., 5, Suppl. : 65.

1936. *Spathosternum prasiniferum prasiniferum* Tinkham, Lingnan. Sci., Journ., Canton, 16 : 51.

Diagnostic characters : Small size; broad blackish or dark green stripe runs behind the lower part of the eyes and below the lateral carinae of the pronotum; central area of the tegmen with a longitudinal black streak which is well marked in female and almost obsolete in male; tegmina and wings well developed.

Material examined : 2♂, 1♀ and 2 nymphs, Biligiri Rangaswamy Temple Hills, 1.iii.1999, Coll. S. Krishnan.

Distribution : India : Widely distributed.

Elsewhere : Bangladesh; Indo-China; Myanmar; Sri Lanka; Thailand; Vietnam.

9. *Oxya nitidula* (Walker)

1870. *Acridium nitidula* Walker, Cat. Derm. Salt. Brit. Mus., 4 : 631.

1970. *Oxya nitidula* Hollis, Bull. Br. nat. Hist. (Ent.), 26(7) : 315.

Diagnostic characters : Medium size; supra anal plate roundly triangular; circus conical, with acutely truncate at apex; ventral surface of sub genital plate of female, with a sub apical tooth on each side of a median apical spine.

Material examined : 1♀, Biligiri Rangaswamy Temple Wildlife Sanctuary, Budipaduga, 18.ii.1999, Coll. S. Krishnan.

Distribution : India : Karnataka, Andhra Pradesh, Goa, Orissa, Rajasthan, Tamilnadu and West Bengal.

Elsewhere : Sri Lanka.

10. *Thoradonta pruthii* Gunther

1938. *Thoradonta pruthii* Gunther, Stettin. Ent. Ztg., 99 : 129-130.

Diagnostic characters : Vertex wider than eye; paired ocelli located below the middle of eyes; lateral margin of pronotum below the shoulders less strongly folded upwards and inwards than other Indian species; median carina of pronotum narrow even at the base and almost directed transversely but not buckled; lateral spine of pronotum narrow even at the base and almost directed transversely.

Material examined : 1♂, Doddasampige, 25.ii.2002, Coll. S. Krishnan.

Distribution : India : Karnataka, Madhya Pradesh and West Bengal.

11. *Paratettix cingalensis* (Walker)

1871. *Tettix cingalensis* Walker, Cat. Derm. Salt. Brit. Mus., 5 : 827.

1914. *Paratettix cingalensis* Kirby, Fauna Brit. India, Orth., : 63.

Diagnostic characters : Head a little or not at all exserted; frontal costa rarely sinuate; paired ocelli placed between the middle of the eyes; tegmina and wings well developed; median carina of pronotum raised and generally arched in front.

Material examined : 2♂, Bhanuvadi, 19.ii.1999, Coll. S. Krishnan; 2♂, Doddasampige, 25.ii.1999, coll. S. Krishnan.

Distribution : India : Arunachal Pradesh, Assam, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Orissa, Sikkim and Tamilnadu.

Elsewhere : Borneo; Hainan; Malaya; Mindano; Sri Lanka; Sumatra and Taiwan.

12. *Euparatettix tennius* Hancock

1912. *Euparatettix tennius*: Hancock, Mem. Dep. Agric. India ent. Ser., 4 : 151.

Diagnostic characters : Body very slender; head exserted; pronotum narrow between shoulders; median carina of pronotum substraight precurrent.

Material examined : 1♀, Bhanuvadi, 19.ii.1999, Coll. S. Krishnan.

Distribution : India : Arunachal Pradesh, Assam, Bihar, Karnataka, Manipur, Meghalaya, Sikkim, Tamilnadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Bangladesh; Myanmar.

13. *Hedotettix gracilis* (De Hann)

1842. *Acridium (Tetrix) gracile* : De Hann, *Temminck verhandel. Orth.* : 167-169.

Diagnostic characters : Frontal costa widely sulcate, the rami more or less abruptly widened between antennae; median carina of pronotum more or less compressed arcuate forwards before the shoulders, highest at the sulci; dorsum convex.

Material examined : 2♀, Budipaduga, 18.ii.1999, Coll. S. Krishnan.

Distribution : India : Throughout.

Elsewhere : Celebes; Java; Maynmar; Sumatra; Sri Lanka; Taiwan; Thailand; Vietnam.

14. *Gryllopsis furcata* (Saussure)

1877. *Gryllopsis furcatus* : Saussure, *Mem. Soc. Geneve*, 25 : 231.

1969. *Gryllopsis furcata* : Chopard, *Fauna of India (Orthoptera)* : *Grylloidea*, 2 : 79.

Diagnostic characters : Medium size; body and legs almost glabrous; body typically blackish brown; pronotum transverse with parallel margin; elytra extends to the 2nd abdominal tergite; wings rudimentary.

Material examined : 3♀, 2 nymphs, Kenkare, 25.ii.1999, Coll. S. Krishnan.

Distribution : India : Mysore and Tamilnadu.

Elsewhere : Sri Lanka.

15. *Gryllodes sigillatus* (Walker)

1869. *Gryllus sigillatus* Walker, *Cat. Derm. Salt. Brit. Mus.*, 1 : 46.

1877. *Gryllodes sigillatus* Saussure, *Mem. Soc. Phys. Gneva*, 25 : 216.

1969. *Gryllodes sigillatus* Chopard, *Fauna of India, Orthopt. Grylloidea*, 2 : 85.

Diagnostic characters : Head small, a little flattened; frontal rostrum much narrower; tegmina of female very short and widely separated; wings absent.

Material examined : 1♂, K. Gudi, 24.ii.1999, Coll. S. Krishnan.

Distribution : India : Widely distributed.

Elsewhere : All tropical countries.

16. *Gryllus bimaculatus* De Geer

1773. *Gryllus bimaculatus* De Geer, *Mem. Ins.*, 3 : 531.

Diagnostic characters : Large size; body completely glabrous; general colour entirely black with two yellow spots at the base of each elytron.

Material examined : 1 ♀, Kenkeae, 25.ii.1999, Coll. S. Krishnan.

Distribution : India : Andaman Islands, Bihar, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Tamilnadu, Uttar Pradesh.

Elsewhere : Africa; Burma; Malaya; Mediterranean region; Pakistan; Singapore and Sri Lanka.

17. *Letana* sp.

Diagnostic characters : Body green with brown colour spots; tegmina extends to the tip of hind femur, radial sector forked; ovipositor short, dorsal and ventral margins of apical part with big spines, space between two spines wide; apex curved.

Material examined : 1 ♂, Hanakere, 27.ii.1999, Coll. S. Krishnan; 1 ♂, Duruguru, 26.iii.1999, Coll. S. Krishnan; 1 ♂, Kenkare, 12.iv.2000, Coll. S. Krishnan.

Distribution : The Genus *Letana* is Indian and Himalayan in origin.

SUMMARY

The present study deals with 17 species of Orthoptera belonging to 5 families, collected by the scientists of Southern Regional Station, Zoological Survey of India, Chennai.

REFERENCES

- HANCOCK, J.L. 1906. Orthoptera, Family Acrididae, Subfamily Tetriginae. *Genera Insectorum Brussels, fasc.*, 48 : 1-19.
- HOLLIS, D. 1971. A preliminary revision of the genus *Oxya* Audinet-Serville (Orthoptera : Acridoidea). *Bull. Br. Mus. Nat. Hist. (Ent.)* : 269-343.
- INGRISWCH, S. 1990. Revision of the genus *Letana* Walker, 1869 (Grylloptera : Tettigonioidea : Phaneropterinae). *Ent. Cand.*, 21(3) : 241-276.
- KIRBY, W. F. 1914. *The Fauna of British India, including Burma, Orthoptera (Acrididae)* Taylor and Francis Co., London, 1x + 276pp.
- SHISHODIA, M. S. and TANDON, S. K. 1993. Insecta : Orthoptera In : *Fauna of West Bengal, State Fauna Series, 3 (Part-4)* : 227-285.

INSECTA : HEMIPTERA

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INTRODUCTION

Hemipteran insects are commonly known as "Bugs" and in India it comprises a fauna of about 7000 species belonging to 76 families of the Suborders Heteroptera and Homoptera. The present paper is based upon a collection of hemipteran insects (excluding the aquatic forms) which was received from the Southern Regional Station, Chennai. The study has yielded 49 species under 38 genera belonging to 16 families of Hemiptera from the Biligiri Rangaswamy Wildlife Sanctuary, Karnataka.

SYSTEMATIC ACCOUNT

Suborder HOMOPTERA

Superfamily CICADELLOIDEA

Family CICADELLIDAE

Genus 1. *Bothrogonia* Melichar

1. *Bothrogonia ferruginea* (Fabricius)

Genus 2. *Cofana* Melichar

2. *Cofana mimica* (Distant)

3. *Cofana spectra* (Distant)

Genus 3. *Kolla* Distant

4. *Kolla insignis* Distant

5. *Kolla raja* Distant

6. *Kolla tigrina* Distant

7. *Kolla unimaculata* (Signoret)

Genus 4. *Tettigella* China & Fennah

8. *Tettigella cornelia* Distant

Genus 5. *Bhandara* Distant9. *Bhandara ceylonica* Melichar

Family NIRVANIDAE

Genus 6. *Sophonia* Walker10. *Sophonia linealis* (Distant)Genus 7. *Kutara* Distant11. *Kutara brunnescens* Signoret

Family HECALIDAE

Genus 8. *Thomsoniella* Signoret12. *Thomsoniella porrecta* Walker13. *Thomsoniella arcuata* Mots

Family IASSIDAE

Genus 9. *Iassus* Fabricius14. *Iassus chlorophana* (Melichar)

Family EVACANTHIDAE

Genus 10. *Signoretia* Stål15. *Signoretia malaya* Stål

Family KRISNIDAE

Genus 11. *Krisna* Spin.16. *Krisna striata* Kirby

Family DELTOCEPHALIDAE

Genus 12. *Banus* Distant17. *Banus obesus* DistantGenus 13. *Exitianus* Ball18. *Exitianus indicus* (Distant)19. *Exitianus nanus* (Distant)Genus 14. *Balclutha* Kirkaldy20. *Balclutha indica* LetherGenus 15. *Thamnotettix* Zetterstedt21. *Thamnotettix veinatus* PruthiGenus 16. *Deltocephalus* Burm22. *Deltocephalus nigrifacialis* (Distant)

Genus 17. *Inazuma* Ishihara23. *Inazuma dorsalis* MotsGenus 18. *Goniagnathus* Fieber24. *Goniagnathus fumosus* DistantGenus 19. *Scaphoideus* Uhler25. *Scaphoideus festivus* Matsumara26. *Scaphoideus morosus* MelicherGenus 20. *Nephrotettix* Matsumura27. *Nephrotettix nigropicta* (Stål)28. *Nephrotettix virescens* (Fabricius)Genus 21. *Nesosteles* Kirkaldy29. *Nesosteles sanguinescens* Kirkaldy

Family MEMBRACIDAE

Genus 22. *Leptocentrus* Stål30. *Leptocentrus taurus* (Fabricius)

Superfamily CICADOIDEA

Family CICADIDAE

Genus 23. *Purana* Distant31. *Purana tigrina* WalkerGenus 24. *Dundubia* Amyot & Serville32. *Dundubia intemerata* Walker33. *Dundubia emanatura* Distant

Superfamily CERCPOOIDEA

Family CERCOPIDAE

Genus 25. *Ptyelus* St. Farg. & Serv.34. *Ptyelus nebulosus* (Fabricius)

Suborder HETEROPTERA

Superfamily LYGAEOIDEA

Family LYGAEIDAE

Genus 26. *Geocoris* Fallen35. *Geocoris tricolor* (Fabricius)36. *Geocoris pulvisculatus* Distant

Genus 27. *Graptostethus* Stål37. *Graptostethus servus* (Fabricius)

Superfamily PENTATOMOIDEA

Family PENTATOMIDAE

Genus 28. *Agonoscelis* Spin.38. *Agonoscelis nubila* (Fabricius)Genus 29. *Nezara* Amyot & Serville39. *Nezara viridula* (Linnaeus)Genus 30. *Hotea* Amyot & Serville40. *Hotea nigrorufa* WalkerGenus 31. *Menida* Motschulsky41. *Menida histrio* (Fabricius)

Family SCUTELLERIDAE

Genus 32. *Chrysocoris* Hahn42. *Chrysocoris perpureus* (Westwood)

Superfamily COREOIDEA

Family ALYDIDAE

Genus 33. *Riptortus* Stål43. *Riptortus fuscus* (Fabricius)44. *Reptortus linearis* (Fabricius)Genus 34. *Leptocorisa* Latr.45. *Leptocorisa acuta* (Thunb.)

Family COREIDAE

Genus 35. *Cletus* Stål46. *Cletus bipunctatus* (Westwood)

Family PYRRHOCORIDAE

Genus 36. *Antilocetus* Stål47. *Antilocetus russus* StålGenus 37. *Dysdercus* Amyot & Serville48. *Dysdercus koenigii* (Fabricius)Genus 38. *Odontopus* Laporte49. *Odontopus nigricornis* Stål

1. *Bothrogonia ferruginea* (Fabricius)

1794. *Tettigoniella ferruginea* Fabricius, *Entomologia Syst*, 4 : 32
 1988. *Bothrogonia ferruginea* (Fabricius) : Datta, B., *Rec. zool. Surv. India Occ. Pap.* No. 90 : 4
 1998. *Bothrogonia ferruginea* (Fabricius) : Ghosh, M & Ghosh, L. K., *Fauna of Meghalaya, State Fauna Series*, 4 (Part-4) : 5.

Diagnosis : Vertex binotate, one near apex, another between ocelli; face with transverse black spot; pronotum with three black spots, one at anterior margin, two to base; scutellum with a central black spot; tegmina reddish brown with apical cells blacking; claval suture with black patch; abdomen black.

Material examined : Locality : Dorasanihalla; 2 males and 3 females, 7.1V.2002, S. Krishnan.

Distribution : India : Andhra Pradesh, Karnataka, Maharashtra, Manipur, Meghalaya, Mizoram, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Borneo, Myanmar, Japan, Java, Korea, Nepal, Philippines, Singapore, Sri Lanka, Sumatra.

2. *Cofana mimica* (Distant)

1908. *Kolla mimica* (Distant), *Fauna Brit. India, Rhynchota*, 4 : 225
 1988 *Cofana mimica* Distant : Datta, B., *Rec. zool. Surv. India, Occ. Pap.* No., 90 : 12
 1998 *Cofana mimica* Distant : Ghosh, M. & Ghosh, L.K., *Fauna of Meghalaya, State Fauna Series*, 4(Part-14) : 8.

Diagnosis : Vertex greenish with three black spot, one at central one at extreme lateral margin and others close to ocelli; face laterally striate; pronotum greenish with fine transverse impression; scutellum with distinct dark longitudinal line; tegmina greenish white; legs yellowish; abdomen dorsally greenish.

Material examined : Locality : Bhanuwadi : 1 male; 19. II. 1999; S. Krishnan.

Distribution : India : Andhra Pradesh, Bihar, Manipur, Meghalaya, Mizoram, Uttar Pradesh, West Bengal.

Remarks : The species is abundant with the viruliferous Cicadellids. This species is frequent on paddy crop during winter season. The vectorial trait of this species is not ascertained.

3. *Cofana spectra* (Distant)

1908. *Tettigoniella spectra* Distant *Fauna of Brit India, Rhynchota*, 4 : 211
 1910. *Cicadella spectra* (Distant) : *Insect, Trans*, 10 : 234

1990. *Cofana spectra* (Distant) : Partact, Cicadomorpha, 3 : 76

Diagnosis : Vertex semicircular, with 4 black spots, one spot at apex and at base and another two spots at central disk with a triangular spot, each ocellus with a black spot; face with black spot; pronotum with central line and transverse striation; tegmina greenish with white tint; abdomen greenish yellow.

Material examined : Locality : Budipaduga, 1 male and 1 female; 19.II.1999; S.Krishnan.

Distribution : India : Assam, Bihar, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Orissa, Sikkim.

Elsewhere : Australia, Bangladesh, Nepal, Philippines, Srilanka.

Remarks : This species is found abundantly along with viruliferous paddy pest during winter period. It also occurs on wild grasses.

4. *Kolla insignis* Distant

1908. *Kolla insignis* Distant, Fauna Brit.India, Rhynchota, 4 : 223

1988. *Kolla insignis* Distant : Datta, B., Rec. zool. Surv. India, Occ. Pap. No., 90 : 16.

1998. *Kolla insignis* Distant : Ghosh, M & Ghosh, L.K., Fauna of Meghalaya, State Fauna Series, 4(Part-4) : 9

Diagnosis : Vertex with two large black spots united at anterior margin and three angulated black spots at central connected by a oblique line; pronotum shiny black, an wavy fascia close to anterior margin;scutellum at each basal angle with a large black spot; tegmina bronzy-black;abdomen brownish.

Material examined : Locality : Gombaekalpadu; 2 females; 9.IV.2000; S. Krishnan.

Distribution : India : Assam, Andhra Pradesh, Karnataka, Manipur, Meghalaya, Mizoram, Uttar Pradesh, West Bengal.

Elsewhere : Nepal.

5. *Kolla raja* Distant

1908. *Kolla raja* Distant, Fauna Brit.India, Rhynchota, 7 : 7.

1988. *Kolla raja* Distant : Datta, B., Rec. zool. Surv. India, Occ. Pap. No. 90 : 15

1994. *Kolla raja* Distant : Ghosh, M & Ghosh, L.K., Fauna of West Bengal, State Fauna Series, 3(Part-5) : 3

Diagnosis : Vertex with a spot close to anterior margin and a spot near posterior margin bluish; face with a large dark olivaceous spot present at anterior margin; pronotum and tegmina olive green, costal with purple blue longitudinal spot; abdomen dark yellow.

Material examined : Locality : Doddasampige; 5 females and 3 males; 2.III.2000; G. Thirumalai.

Distribution : India : Himachal Pradesh, Karnataka, North Bengal, Sikkim.

6. *Kolla tignina* Distant

1918. *Kolla tignina* Distant, *Fauna Brit. India, Rhynchota*, 7 : 9

1965. *Kolla tignina* Distant: Metcalf, *General Catalogue of Homop.* I : 445

Diagnosis : Vertex with three black spots, one at apex, another two between eyes, pronotum with a small black spot at anterior margin and a submarginal black fascia centrally produced to vertex; tegmina reddish yellow, with black longitudinal fasciae, one in clavus, another in claval margin.

Material examined : Locality : K. Gudi-Biligiri road and Kenkare; 5 females and 2 males; 24.II.1999; S. Krishnan.

Distribution : India,: Karnataka, Mizoram, Tamilnadu.

7. *Kolla unimaculata* (Signoret)

1854. *Tellionia unimaculata* (Signoret), *Ann. Ent. Soc. France*, 2(3) : 26

1988. *Kolla unimaculata* (Signoret) : Datta. B., *Rec. zool. Surv., Occ. Pap.* No., 90 : 16.

1998. *Kolla unimaculata* (Signoret) : Ghosh, M & Ghosh, L.K., *Fauna of Meghalaya, State Fauna Series*, 4(Part-4) : 9

Diagnosis : Vertex semicircular, with two dark black spots at anterior margin and two small spots at basal margin, sometimes obsolete in male; pronotum at middle a transverse black band triangularly produced; scutellum at base with two elongate black spots; tegmina at claval area blackish; a reddish longitudinal band extending upto apical cell.

Material examined : Locality : Gombaekalpodu; 2 females; 9. IV.2000; S. Krishnan; Locality : Girilla; 3 males and 1 female; 22.II.1999; S. Krishnan.

Distribution : India : Andhra Pradesh, Karnataka, Meghalaya, Tamilnadu, West Bengal.

Elsewhere : Java, Malacca, Philippines, Sri Lanka.

Remarks : The species may cause the spike disease of sandalwood.

8. *Tettigella cornelia* Distant

1908. *Tettigella cornelia* Distant, *Fauna Brit. India, Rhynchota*, 4 : 209

1968. *Tettigella cornelia* Distant : Metcalf *General Catalogue of Homop.*, I : 133.

Diagnosis : Vertex with five large black spots, one spot at anterior margin, one spot at inner margin of eyes and one at ocellus area; at ocellus a longitudinal reddish line and brownish transverse line; pronotum with three longitudinal brownish fasciae; scutellum with three reddish fasciae and one angulate spot at base; tegmina purplish.

Material examined : Locality : K Gudi-Biligiri road; 2 females; 24.II.1995; S. Krishnan.

Distribution : India : Karnataka.

Elsewhere : Myanmar.

9. *Bhadara ceylonica* Melichar

1903. *Tettigonia ceylonica* Melichar, Hom. Faun. Ceylon : 1412

1968. *Bhadara ceylonica* Melichar: Metcalf, General Catalogue of Homop., I : 251.

Diagnosis : Vertex yellow, brown eyes; front with a black dot at each side near anterior margin and series of black dots on the tip; pronotum with a black spot at central of its posterior margin; tegmina light yellowish.

Material examined : Locality : Hanakere; 1 female; 27.II.1999; S. Krishnan.

Distribution : India : Karnataka.

Elsewhere : Java, Srilanka.

10. *Sophonia linealis* (Distant)

1908. *Nirvana linealis* Distant, Fauna Brit.India, Rhynchota, 4 : 282

1963. *Sophonia linealis* Distant : Metcalf General Catalogue of Homop., 7 : 27

Diagnosis : Vertex about twice as long as pronotum, with a reddish central spot and two reddish longitudinal lines united at basal angle; protonum with a central piceous line; scutellum with dark longitudinal line; tegmina indistinct, slender longitudinal vein.

Material examined : Locality : K. Gudi-Biligiri road; 3 females; 24.II.1999; S. Krishnan.

Distribution : India; Karnataka, West Bengal.

Elsewhere : Java.

11. *Kutara brunnescens* Distant

1908. *Kutara brunnescens* Distant, Fauna Brit.India, Rhynchota, 4 : 309

1966. *Kutara brunnescens* Distant : Metcalf, General Catalogue of Homop., 15 : 184.

Diagnosis : Vertex with a transverse black centrally widened line at anterior margin; face with a dark central line; pronotum with darker mottling; scutellum with a bronzy spot at base; tegmina greenish brown, apical and anti apical cell with pitchy brown maculate.

Material examined : Locality : Dorasanhalla; 1 female; 7.IV.2000; S. Krishnan.

Distribution : India : Karnataka.

Elsewhere : Sri Lanka.

12. *Thomsoniella porrecta* (Walker)

1858. *Thomsoniella porrecta* Walker, List. Hom. Brit. Mus : 362

1998. *Thomsoniella porrecta* Walker : Ghosh, M & L.K. Ghosh, Fauna of Meghalaya, State Fauna Series, 4(Part-4) : 22.

Diagnosis : Vertex with four orange red fasciae, its anterior margin blackish; pronotum with six fasciae and scutellum also with three striae in some specimen fasciae obsolete; tegmina with a small spot at apex of clavus and at middle of apical cells.

Material examined : Locality : Hanakere; 1 female; 27.II.1999, S. Krishnan.

Distribution : India : Assam, Karnataka, Manipur, Meghalaya, Mizoram, Orissa, Sikkim, Tripura, West Bengal.

Elsewhere : Australia, Formosa, Philippines.

Remarks : The species is recorded as rice leaf hopper. Pest of common sandal wood trees.

13. *Thomsoniella arcuata* (Motsch.)

1859. *Aeocephalus arcuata* Motsch, Etud Ent., 8 : 15

1988. *Thomsoniella arcuata* (Motsch) : Datta, B. Rec. zool. Surv. India, Occ. Pap. No. 90 : 186.

Diagnosis : Vertex semicircular, with a bow-like orange-red fascia, posterior one smaller with a pair of bow-like orange-red fasciae, posterior one smaller; scutellum with three ferrugineous bands; tegmina with three orange-red longitudinal fasciae, veins croceous.

Material examined : Locality: Doddasamige; 1 female; 2.II.2000; G. Thirumalai.

Distribution : India : Karnataka, Tamilnadu.

Remarks : The species is parasitized by *Halictophagus serratus* Bohart (Halictophagidae : Strepsitera)

14. *Jassus chloraphana* (Melichar)

1903. *Pachyopsis chlorophanus* Melichar, Hom Fauna Ceylon : 153

1966. *Jassus chloraphana* (Melichar) : Matcalf, General Catalogue of Homop., 15 : 58.

Diagnosis : Vertex smooth; eyes and ocelli red; pronotum finely distinctly striate;

scutellum base obscurely depressed; tegmina brownish yellow with a minute pitchy black spot at apex of clavus and costal and subhyaline.

Material examined : Locality: Budipaduga; 12 females and 2 males; 28.II.2000; G. Thirumalai.

Distribution : India, Andhra Pradesh, Karnataka, West Bengal.

Elsewhere : Sri Lanka, Myanmar.

15. *Signoretia malaya* (Stål)

1855. *Thamnoatettix malaya* (Stål), Ofv. Vet. Ak Förh 192

1966. *Signoretia malaya* (Stål) : Metcalf, General Catalogue of Homop, VI : 55.

Diagnosis : Vertex with central transverse carination and a small dark black spot; face with transverse ridged; pronotum on its surface granulose and two central longitudinal ridges; tegmina greenish, longitudinal vein roughly punctate; legs greenish.

Material examined : Locality : Gombaekalpodu; 1 female; 9.IV.2000, S. Krishnan.

Distribution : India : Karnataka.

Elsewhere : Fukein, Luzon, Philippines, Singapore, Myanmar.

16. *Krisna striata* Kirkaldy

1901. *Krisna striata* Kirkaldy, Entomologist, 34 : 39

1988. *Krisna striata* Kirkaldy : Datta, B., Rec. zool. Surv. India., Occ. Pap. No. 90 : 220

Diagnosis : Vertex semicircular with reddish apicad; front black; pronotum strongly transversely striated; scutellum also transversely striated; tegmina strongly wrinkled and truncate, its apicad-third reticulate; legs reddish.

Material examined : Locality: Honnamatti, 1 male; 20 : II.1999; S. Krishnan.

Distribution : India: Andhra Pradesh, Karnataka, Mizoram.

Elsewhere: Philippines, Sri Lanka.

17. *Banus obtatus* Distant

1908. *Banus obtatus* Distant, Fauna Brit. India, Rhynchiota, 4 : 253.

1988. *Banus obtatus* Distant, Datta, B., Rec. zool. Surv. India, Occ. Pap. No, 90 : 96.

Diagnosis : Vertex semi-triangulate, with a longitudinal line and irregular pitchy black marks and a black spot near inner margin of each eyes; pronotum with scattered black

spot on anterior area; scutellum with an obscure brownish spot near each basal angle and two spots on disk; tegmina shining, legs brownish.

Material examined : Locality : Dorasanihala; 2 females and 1 male; 7.IV.2000; S. Krishnan.

Distribution : India : Karnataka.

Elsewhere : Sri Lanka, Myanmar.

18. *Exitianus indicus* (Distant)

1908. *Athysanus indicus* Distant, *Fauna Brit India, Rhynchota*, 4 : 344.

1998. *Exitianus indicus* Distant : Ghosh & Ghosh, *Fauna of Meghalaya, State Fauna Series*, 4(Part-4) : 18.

Diagnosis : Vertex with a transverse distinct black fascia between eyes, and indistinct longitudinal line at base; pronotum with a series of distinct brownish dot at anterior margin; scutellum with brownish granules; tegmina grayish; legs brownish.

Materials examined : Locality : Girialla; 3 males and 2 females; 22.II.1999; S. Krishnan. Locality : Budipaduga; 3 males and 4 females; 28.II.2000; S. Krishnan.

Distribution : India : Assam, Andhra Pradesh, Karnataka, Manipur, Meghalaya, Orissa, Punjab, Sikkim, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Australia, China, Philippines.

19. *Exitianus nanus* (Distant)

1908. *Athysanus nanus* Distant, *Fauna Brit.India, Rhynchota*, 4 : 345

1998. *Exitianus nanus* Distant : Ghosh, M & Ghosh, L.K., *Fauna of Meghalaya, State Fauna Series*, 4(Part-4) : 19.

Diagnosis : Vertex with an arcuate piceous fascia between eyes; pronotum grayish, on its anterior margin two piceous spots; scutellum at basal angle with a dark spot; tegmina subhyaline, vein brown; intermediate coxae with a piceous spot.

Material examined : Locality : Budipaduga : 1 female; 28.II.2000; G. Thirumalai.

Distribution : India : Andhra Pradesh, Bihar, Himachal Pradesh, Karnataka, Meghalaya, Orissa, Punjab, Sikkim, Tamilnadu, West Bengal.

Elsewhere : China, Formosa, Nepal, Philippines.

20. *Balclutha indica* (Pruthi)

1930. *Eugnathodus indicus* Pruthi, *Mem. Ind. Mus.*, XI : 48-49.

1967. *Balclutha indica* (Pruthi); Melcalf; *General Catalogue of Homop.*, X : 2407.

Diagnosis : Vertex very short, one fourth as long as pronotum, sulcate medially, semicircular apical; pronotum wider posteriorly; scutellum later impressed medially; tegmina hyaline; abdomen black.

Material examined : Locality: Honnemetti; 2 females; 20.2.1999; S. Krishnan.

Distribution : India : Karnataka, Tamilnadu, Madhya Pradesh, Punjab, Sikkim.

21. *Thamnotettix veinatus* Pruthi

1930. *Thamnotettix veinatus* Pruthi, Mem. Ind. Mus., II : 63-64

1988. *Thamnotettix veinatus* Pruthi: Datta, B., Rec. zool. Surv. India, Occ. Pap. No. 90 : 184.

Dingnosis : Vertex with dark patches and spots basally sulcate; pronotum brownish yellow with a dark brown spot at anterior margin; scutellum at anterior margin with a pair of dark stripes, and a distinct black spot at basal angle; tegmina brown, vein pigmented brown or dark; metatibial spines, dotted black at each other.

Material examined : Locality; Kenkare; 2 females; 1.III.1999; S. Krishnan.

Distribution : India : Karnataka, South India, West Bengal.

Remarks : The species is vector of spike disease of sandal wood plant.

22. *Deltocephalus nigrifacilis* Distant

1918. *Deltocephalus nigrifacilis* Distant, Fauna Brit. India, Rhynchota, 7 : 81

1988. *Deltocephalus nigrifacilis* Distant : Datta, B., Rec. zool. Surv. India, Occ. Pap. No. 90 : 119.

Dingnosis : Vertex with two pairs of large brownish spots; one pair at between eyes and another pair on central area; Pronotum with four longitudinal brownish fasciae; scutellum with a black spot at each basal angle; tegmina with dark patches; meta tibiae finely spotted.

Material examined : Locality : Kenkare; 3 females; 1.III.1999; S. Krishnan.

Distribution : India : Karnataka, Sikkim, West Bengal.

23. *Inazuma dorsalis* (deMots)

1859. *Deltocephalus dorsalis* de Mots., Etude En., 8 : 114.

1953. *Inazuma dorsalis* (deMots), Matsuyama Agri. Col..Sci. Rpt., 11 : 48

1998. *Inazuma dorsalis* (deMots), Ghosh, M & Ghosh, L. K, Fauna of Meghalaya, State Fauna Series, 4(Part-4) : 21

Diagnosis : Vertex binotate at base; pronotum with shades; scutellum at each basal angle with a spot; tegmina with oblique fuscus forming central spot; at clavus suture,

brown color extend from apex of clavus to apical cells, a linear dark line beyond costal margin.

Material examined : Locality : Kenkare; 2 females; 1.III.1999; S. Krishnan.

Distribution : India : Karnataka, Meghalaya, Tamilnadu, West Bengal.

Elsewhere : Asian countries, Myanmar, Sri Lanka.

24. *Goniagnathus fumosus* Distant

1918. *Goniagnathus fumosus* Distant, *Fauna Brit. India, Rhynchota*, 7 : 43

1967. *Goniagnathus fumosus* Distant: Metcalf, *General Catalogue of Homop.*, X : 1910.

Diagnosis : Vertex covered with distinct black spot; pronotum with distinct black striation; scutellum brownish, apical area blackish, its vein and costal area finely black spotted.

Materials examined : Locality : Hanakere; 1 male and 1 female; 27.II.1999; S. Krishnan

Distribution : India; Karnataka, Tamilnadu, Uttar Pradesh.

25. *Scaphoideus festivus* Matsumura

1902. *Scaphoideus festivus* Matsumura, *Termesz. Fizetek*, 25 : 384.

1967. *Scaphoideus festivus* Matsumura : Metcalf, *General Catalogue of Homop.*, X : 2123.

Diagnosis : Vertex creamish with a transverse reddish brown fascia at anterior margin of eyes ; pronotum with reddish brown fascia ; at base a longitudinal white line ; tegmina reddish brown with some slanting reddish spots and a series of prominent spots arranged in pair of each claval suture, at optical area reddish spot present.

Material examined : Locality : Kenkare; 1 male and female; 12.IV.2000; S. Krishnan.

Distribution : India: Karnataka, Tamilnadu, Mizoram.

26. *Scaphoideus morosus* Melichar

1903. *Scaphoideus morosus* Melichar, *Hom. Fauna Ceylon* : 197.

1988. *Scaphoideus morosus* Melichar: Datta, B, *Rec. zool. Surv. India, Occ. Pap.* No. 90 : 176.

Diagnosis : Vertex whitish, with a fine sub-apical line and basal fascia between eyes; pronotum with 4 broad longitudinal brownish testaceous fasciae; scutellum with three stripes on posterior half and apical cell with piceous spot produced by white spots.

Material examined : Locality : Budipaduga; 1 male & 1 female; 28.II.2000; S. Krishnan.

Distribution : India : Andhra Pradesh, Assam, Karnataka, West Bengal.

Elsewhere : Java, Luzon, Philippines, Sri Lanka

27. *Nephrotettix nigropicta* (Stål)

1870. *Nephrotettix nigropicta* (Stål), Ofr. vet. Ak. Forh : 74.
1998. *Nephrotettix nigropicta* (Stål) : Ghosh, M & Ghosh, L.K., Fauna of Meghalaya, State Fauna Series, 4(Part-4) : 20.

Diagnosis : Vertex greenish yellow, smooth and shinning; vertex with a sub-impressed line at anterior margin; tegmina greenish, claval area black, tegmina with a oblique broad strip extending medial to claval suture. legs and abdomen black.

Material examined : Locality : Budipaduga; 2 males and 2 females; 28.II.2000; G. Thirumalai.

Distribution : India : Karnataka, Manipur, Meghalaya, Mizoram, Orissa, Sikkim, West Bengal.

Elsewhere : East Africa, East Asia, Japan, Luzon, Malay peninsula, Sri Lanka.

Remarks : The species is recorded as viruliferus on paddy. It occurs with *Nephrotettix virescens* (Fabr.) during winter period in the Eastern and Southern India.

28. *Nephrotettix virescens* (Fabricius)

1803. *Nephrotettix virescens* (Fabricius), Sys. Rhyn : 78.
1998. *Nephrotettix virescens* (Fabricius) : Ghosh & Ghosh, Fauna of Meghalaya, State Fauna Series, 4(Part-4) : 20.

Diagnosis : Vertex greenish, smooth and shinning, on each side of clypeus a black spot and at face a dark transverse line; tegmina with a black spot; in female specimen usually without discal spot at tegmina.

Material examined : Locality : Kobarmathi; 3 males and 5 females; 26.II.1999; S. Krishnan.

Distribution : India : Karnataka, Manipur, Meghalaya, Orissa, Tripura, Sikkim, West Bengal.

29. *Nesosteles sanguinescens* Kirkaldy

1906. *Nesosteles sanguinescens* Kirkaldy, Bul. Hawaii. Sugaplanters Assoc. Div. Ent., I(9) : 343.
1988. *Nesosteles sanguinescens* Kirkaldy : Datta, B., Rec. zool. Surv. India, Occ. Pap. 90 : 149.

Diagnosis : Vertex sulcate, pronotum with three pink discad stripes extending to scutellum, granulate; scutellum deeply impressed medially; tegmina with reddish stripes; legs and abdomen dark brown.

Material examined : Locality : Girialla; 1 female; 22.II.1999; S. Krishnan.

Distribution : India : Karnataka, Madhya Pradesh, Punjab, West Bengal.

Elsewhere : Fiji Island, Christmas Island.

30. *Leptocentrus taurus* (Fabricius)

1775. *Membracius taurus* Fabr, Syst, Ent. : 676
 1908. *Leptocentrus taurus* (Fabricius) : Distant, Fauna Brit. India, Rhynchota, 4 : 20
 1994. *Leptocentrus taurus* (Fabricius) : Biswas, Basu and Ghosh, Fauna of West Bengal, State Fauna Series, 3(Part-5) : 76.

Diagnosis : Head and pronotum black, thickly punctate, posterior pronotal process tricarinate above, curved and apically touching the inner margin of tegmina; suprumerus robust, strongly recurved, tricarinate above; distant half of costal tegminal margin black; hind wings with four apical cells; tibiae reddish brown.

Material examined : Locality : Girialla, 1 ex; 22.II.1999; S. Krishnan.

Distribution : India : Assam, Karnataka, Sikkim, Tamilnadu, Uttar Pradesh, West Bengal.

Elsewhere : Borneo, Cambodia, China, Myanmar, Philippines, Siam, Sumatra.

31. *Purana tigrina* Walker

1850. *Purana tigrina* Walker. List of Homopteran insect. Brit. Mus., 7 : 69
 2000. *Purana tigrina* Walker : Ghosh et al, Fauna of Tripura, State Fauna Series, 7(Part-2) : 336.

Diagnosis : Body robust, vertex greenish yellow with a black spot at lateral area; pronotum with two central longitudinal black lines, mesonotum with on each side a short curved fascia and two small black spots at cruciform elevation, tegmina hyaline, venation brownish yellow, fuscous towards apical area.

Material examined : Locality : Sebinakare; 1 female; 7.IV.2000; S. Krishnan.

Distribution : India : Andhra Pradesh, Karnataka, Tripura.

Elsewhere : Malay Peninsula.

32. *Dundubia intemerata* Walker

1856. *Dundubia intemerata* Walker, J. Linr. Soc. Zool., I : 84
 1998. *Dundubia intemerata* Walker, Sen. et al., Fauna of Meghalaya, State Fauna Series, 4(Part-4) : 297.

Diagnosis : Body robust, vertex triangularly elongated; ocelli red, eyes dark red; pronotum as long as mesonotum, distinctly toothed; tegmina hyaline; veins brownish.

Material examined : Locality : Maralukalukere, 1 male, 24.II.1999; S. Krishnan.

Distribution : India : Assam, Karnataka, Meghalaya, Sikkim.

Elsewhere : Borneo, Malay peninsula, Myanmar, Singapore, Sumatra, Tenasserim.

33. *Dundubia emanatura* Distant

1889. *Dundubia emanatura* Distant, A.M.N.H (6) III : 51.

1963. *Dundubia emanatura* Distant : Metcalf, General Catalogue of Homop. VIII : 529.

Diagnosis : Vertex with a narrow, reticulate, transverse black fascia between the eyes and a black spot at lateral angles; pronotum with narrow black lateral marginal fascia; tegmina hyaline, the venation greenish, abdomen with a black marginal fascia.

Material examined : Locality : Kenkare; 1 male; 25.1999; S. Krishnan.

Distribution : India : Karnataka, Nilgiri Hills.

34. *Ptyelus nebulosus* Distant

1794. *Ptyelus nebulosus* Distant, Fauna Brit. India, Rhynchota, 4 : 88.

1994. *Ptyelus nebulosus* Distant : Biswas, Ghosh and Basu, Fauna of West Bengal, State Fauna Series, 3(Part-5) : 16.

Diagnosis : Body pale yellowish grey, face transversely striate on its lateral area; head with two small black spots on its anterior margin; tegmina with an oblique transverse spot beyond the middle of the costal margin and a minute costal spot towards the apex, an oblique anterior fascia and a somewhat large spot at the commissure; pronotum with two small but distinct foveate spot near its anterior margin.

Material examined : Locality; Sebinakare, 1 ex., 7.IV.2000. S. Krishnan.

Distribution : India : Bihar, Karnataka, Maharashtra, Tamilnadu, and West Bengal.

Elsewhere : Sri Lanka, Java.

35. *Geocoris tricolor* (Fabricius)

1798. *Cimex tricolor* Fabr., Ent. Syst. Suppl., : 536.

1902. *Geocoris tricolor* Fabr. : Distant, Fauna Brit. India, Rhynchota, 2 : 29

Diagnosis : Head luteous; pronotum and scutellum black; membrane semihyaline reflecting the dark abdomen beneath; anterior black; body beneath black; coaxial legs, abdomen above, extreme lateral margins of sternum and rostrum ochraceous; first joint of rostrum a little longer than second.

Material examined : Locality : Budipaduga, 1 ex., 18.II.1999, S. Krishnan.

Distribution : India : Karnataka, West Bengal.

Elsewhere : Myanmar, Sri Lanka.

36. *Geocoris pulvisculatus* Distant

1904. *Geocoris pulvisculatus* Distant, *Fauna Brit. India, Rhynchota*, 2 : 30.
 1988. *Geocoris pulvisculatus* Distant, *Mukhopadhyay, Rec. zool. Surv. India, Occ. Pap.* No. 107 : 24.

Diagnosis : Body and head generally ochraceous, head with fuscous designs in collar region, first, second, third antennal segments darker than luteus, fourth segment, pronotum coarsely punctate; scutellum with two basal tumescence clavas with single complete row of punctures and corium with two rows of diverging punctures.

Material examined : Locality : Basavanagodu, 1 ex., 28.II.1999, S. Krishnan.

Distribution : India : Karnataka, West Bengal.

Elsewhere : Pakistan.

37. *Graptostethus servus* Fabricius

1787. *Graptostethus servus* Fabricius, *Mant*, 2 : 300.
 1902. *Graptostethus servus* Distant, *Fauna Brit. India, Rhynchota*, 2 : 8
 1994. *Graptostethus servus*, Chakraborty and Ghosh, *Fauna of West Bengal, State Fauna Series*, 3(Part-5) : 4-7.

Diagnosis : Pale obscure blood reddish, a small spot at inner margin of eyes, a transverse anterior fascia and two angulated sub-basal fasciae to pronotum, scutellum with a large oblique subclaval spot and a smaller marginal spot to corium, membrane with a large irregular spot the lateral area of each sternal segment, basal spot and apical margin to membrane grayish.

Material examined : Locality : Hanakere, 1 ex., 27.II.1999, S. Krishnan.

Distribution : India : Karnataka, Kerala, Maharashtra, Meghalaya, West Bengal.

Elsewhere : Australia, China, Myanmar, Malay Archipelago, Sri Lanka, South Africa, South Palaearctic region.

38. *Agnoscelis nubila* (Fabricius)

1775. *Cimex nubila* Fabr., *Syst. Ent.*, 712
 1904. *Agnoscelis nubila* : Distant, *Fauna Brit. India, Rhynchota*, 1 : 189.
 1999. *Agnoscelis nubila* Distant : Chakraborty and Ghosh, *Fauna of Meghalaya, State Fauna Series*, 4(Part-4) : 399.

Diagnosis : Body yellowish brown with black punctures except the lateral margins and central fascia of head; an irregular fascia to pronotum; apex of scutellum levigate; luteous rugosities on the anterior lateral areas of the scutellum; body beneath and legs luteous;

membrane fuliginous with piceous veins; antennae, apex of rostrum, tibiae, tarsi and apices of femora black.

Material examined : Locality : Bhanuwadi 3 exs, 19.II.1999, S. Krishnan; Hanakere, 3exs., 27.II.1999, S. Krishnan.

Distribution : India : Bihar, Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Nagaland, Orissa, Tamilnadu, West Bengal.

Elsewhere : China, Japan, Myanmar, Malay Peninsula and Sri Lanka.

39. *Nezara viridula* (Linnaeus)

1758. *Cimex virudula* Linn., *Syst. Nat.*, 10 : 444

1904. *Nezara viridula* Linn., : Distant, *Fauna Brit. India, Rhynchota*, 1 : 220.

1999. *Nezara viridula* Linn., : Chakraborty & Ghosh, *Fauna of Meghalaya, State Fauna Series, 4(Part-4)* : 405.

Diagnosis : Body above dark green or greenish ochraceous; antennae green with apices of third, fourth and fifth segment purplish brown; extremities of segmental angles of abdomen black; there are two spots at base of head, three spots on anterior area of pronotum, three basal and the apical spots to scutellum and a discal spot on corium in some variety head (excluding base), anterior and lateral margins of pronotum pale luteous.

Material examined : Locality : B.R.T hills, 2 exs., 1.III.1999, S. Krishnan; Hanakere, 2exs., 27.II.1999, S. Krishnan; Honnametti, Bedaguli, 1 ex., 20.II.1999, S. Krishnan.

Distribution : India : Karnataka, Cosmopolitan.

40. *Hotea nigrorufa* Walker

1867. *Hotea nigrorufa* Walker, *Cat. Het.*, 1 : 57

1904. *Hotea nigrorufa* Walker : Distant, *Fauna Brit. India, Rhynchota*, 1 : 66.

Diagnosis : Body castaneous, antennae specially with fourth and fifth joint and body robust the lateral margins of the pronotum the connexivum and the lateral margins of the abdomen beneath distinctly ochraceous.

Material examined : Locality : Hanakere, 1 ex., 27.III.1999. S. Krishnan.

Distribution : India : Karnataka, Tamilnadu.

41. *Menida histrio* (Fabricius)

1787. *Cimex histrio* Fabr., *Mant Inst.*, 2 : 296.

1904. *Menida histrio* Fabr., : Distant, *Fauna Brit. India, Rhynchota*, 1 : 228.

1994. *Menida histrio* Fabr., : Chakraborty, Ghosh and Basu, *Fauna series of West Bengal, State Fauna Series*, 3(Part-5) : 482.

Diagnosis : Body ochraceous, margin of head and above with four longitudinal lines blackly punctate; scutellum with a spot in each basal angle, an anterior discal spot and one on each lateral margin a little before apex black; corium with the apical area. reddish ochraceous, containing a black spot.

Material examined : Locality : Biligiri Rangaswamy Temple Hills, 3 exs, 1.III.1999, S. Krishnan.

Distribution : India : Karnataka, Orissa, West Bengal.

42. *Chrysocoris purpureus* (Westwood)

1837. *Callidea purpureus* Westwood. In : *Hope Cat.*, 1 : 15.

1904. *Chrysocoris purpureus* : Distant, *Fauna Brit. India, Rhynchota*, 1 : 58.

1994. *Chrysocoris purpureus* Westwood : Chakraborty, Ghosh and Basu. *Fauna of West Bengal, State Fauna Series*, 3(Part-5) : 487.

Diagnosis : Body above bluish or purplish green; pronotum with two spots on anterior disk and three on posterior disk; seven spots on scutellum, six arranged in pairs and one on anterior disk; body beneath, base of first joint of antennae and femora ochraceous; a central sternal spot ochraceous.

Material examined : Locality : Budipaduga, lex., 18.II.1999, S. Krishnan.

Distribution : India : Andhra Pradesh, Tamilnadu, Karnataka, West Bengal.

43. *Riptortus fuscus* (Fabricius)

1798. *Lygaeus fuscus* Fabr., *Ent. Syst. Suppl.*, : 539.

1904. *Riptortus fuscus* : Distant, *Fauna Brit. India, Rhynchota*, 1 : 414.

1994. *Riptortus fuscus* : Basu and Mitra. *Fauna of West Bengal, State Fauna Series*, 3(Part-5) : 451.

Diagnosis : Dark brownish, posterior margin of pronotum and a lateral fascia on each side of the head not extending beyond base of antennae, pale laevigate sternal spots are partially or totally absent, if present are small and usually obliterated on metasternum.

Material examined : Locality : Sebinakare, 1 ex., 7.IV.2000. S. Krishnan.

Distribution : India : Assam, Bihar, Karnataka, Kerala, Maharashtra, Uttar Pradesh, West Bengal.

Elsewhere : Myanmar, Malay peninsula, Sri Lanka.

44. *Riptortus linearis* (Fabricius)

1725. *Lygaeus linearis* Fabricius, *Syst. Ent.*, : 710.
 1904. *Riptortus linearis* : Distant, *Fauna Brit. India., Rhynchota*, 1 : 415.
 1994. *Riptortus linearis*; Basu and Mitra, *Fauna of West Bengal, State Fauna Series, 3(Part-5)* : 415.

Diagnosis : Body dark cinemon brown, lateral pronotal spines less acute and small, pronotal disc with no distinct rugosities; posterior femora with a ventrolateral row of thin spines.

Material examined : Locality : B.R.T hills, 1 ex., 1.III.1999, S. Krishnan; Girialla, 1ex, 22.II.1999, S. Krishnan; Basavanagodu, 3 exs 28.II.1999, S.Krishnan.

Distribution : India : Karnataka, Maharashtra, Meghalaya, Sikkim, West Bengal.

Elsewhere : Myanmar, Sri Lanka.

45. *Leptocoris acuta* (Thunberg)

1783. *Cimex acuta* Thunb., *Nov. Ins. sp.*, 2 : 34.
 1904. *Leptocoris acuta* : Distant, *Fauna Brit. India, Rhynchota*, 1 : 410
 1994. *Leptocoris acuta* : Basu & Mitra, *Fauna of West Bengal, State Fauna Series, 3(Part-5)* : 450.

Diagnosis : Body cylindrical, pale brown in color, head elongated, antennae pale, first and fourth joint longest and subequal in length while second and third shortest and subequal; a small distinct tubercle near each lateral pronotal angle; pronotum with a distinct mid longitudinal carina; rostrum short hardly reaching apices of the second coxae.

Material examined : Locality : Dorasanialla, 15 exs., 7.IV.2000, S. Krishnan; Kenkare, 51 exs, 1.III.1999, S. Krishnan; Kenkare, 9 exs, 25.III.1999, S. Krishnan; K. Gudi, Biligiri road, 8 exs 24.II.1999, S. Krishnan; K. Gudi, Chenthakodi, 2 exs, 8.IV.2000, S. Krishnan; Biligiri Rangaswamy Temple Hills, 1ex., 1.III.1999, S. Krishnan.

Distribution : India : Assam, Bihar, Karnataka, Kerala, Maharashtra, Meghalaya, Sikkim, Tamilnadu, West Bengal.

Elsewhere : Australia, Bhutan, Hongkong, Myanmar, Malaya, New Guinea, Pakistan, Sri Lanka, Sumatra, Solomon islands, Thailand, Vietnam.

46. *Cletus bipunctatus* Westwood

1904. *Cletus bipunctatus* Westwood., In : *Hope Cat.*, 2 : 23.
 1904. *Cletus bipunctatus* : Distant, *Fauna Brit. India, Rhynchota*, 1 : 393.
 1994. *Cletus bipunctatus* : Basu and Mitra, *Fauna of West Bengal, State Fauna Series, 3(Part-5)* : 454.

Diagnosis : Pale ochraceous with body beneath and legs luteous; pronotum with darkly punctuate posterior area, corium somewhat roseate; a small spot on lateral area of each sternal segment and a few small discal spots to abdomen black; antennae pale reddish ochraceous, the apical joint fuscous, pronotal lateral angles shortly but acutely produced, the apices of the spine fuscous.

Material examined : Locality : Biligiri Rangaswamy Temple Hills, 2 exs, 1.III.1999, S. Krishnan.

Distribution : India : Karnataka, Maharashtra, Meghalaya, West Bengal.

Elsewhere : Myanmar.

Remarks : Commonly known as sugarcane black bug.

47. *Antilocus russus* Stål

1863. *Antilocus russus* Stål, *Bert. ent. Zeitschr.*, 7 : 394.

1902. *Antilocus russus* : Distant, *Fauna Brit. India, Rhynchota*, 2 : 101.

1994. *Antilocus russus* : Sen, Biswas and Basu, *Fauna of West Bengal, State Fauna Series*, 3(Part-5) : 440.

Diagnosis : Blood reddish; membrane brownish ochraceous with a black rounded spot near its base, two transverse series of punctures to pronotum; corium thickly punctate, anterior femora spined beneath near apices

Material examined : Locality : Dorasanialla, 1 ex., 7.IV.2000, S. Krishnan.

Distribution : India : Andaman Islands, Assam, Kashmir, Karnataka, Meghalaya, Sikkim.

Elsewhere : Bhutan.

48. *Dysdercus koenigii* (Fabr.)

1775. *Cimex koenigii* Fabr, *Syst. Ent.*, 719.

1902. *Dysdercus cingulatus* : Distant, *Fauna Brit. India, Rhynchota*, 2 : 118.

1994. *Dysdercus koenigii* : Sen, Biswas and Basu, *Fauna of West Bengal, State Fauna Series*, 3(Part-5) : 439.

Diagnosis : Generally ochraceous, head, rostrum, lateral margin of pronotum, body underneath blood reddish; scutellum, antennae, apex of rostrum, membrane, discal rounded spots to corium and legs black; anterior margin of pronotum, posterior margin of sternal abdominal segment and spots near to coxae creamy white.

Material examined : Locality : Honnemetti Bedaguli, 1 ex., 20.II.1979, S. Krishnan; Maralukalukare, 1 ex., 3.IV.1999, G. Thirumalai; Budipaduga, 18.II.1999, S. Krishnan; Kankare 1 ex.2, 25.II.1999, S. Krishnan; Banuwadi, 2 exs. 19.II.1999, S. Krishnan

Distribution : India : Andaman islands, Assam, Karnataka, Meghalaya, Sikkim, West Bengal.

Elsewhere : Myanmar, Sri Lanka.

49. *Odontopus nigricornis* Stal

1861. *Odontopus migricornis* Stål Stett, ent. Zeit., 22 : 146.

1902. *Odontopus migricornis* : Distant, Fauna Brit. India., Rhynchota, 2 : 109

1994. *Odontopus migricornis*: Sen, Biswas and Basu, Fauna of West Bengal, State Fauna Series, 3(Part 5) : 76.

Diagnosis : Sanguineous, or ochraceous red, a round spot near apical angle of corium, basal margin of scutellum black, anterior femora finely serrate beneath and armed with one or two spines; antennae with third joint shortest and first and second joint sub-equal in length.

Material examined : Locality : Budapaguda, 1 ex, 28.II.2000. G. Thirumalai; Bilgiri Rangaswamy Temple Hills, 1 ex, 1.III.1999, S. Krishnan.

Distribution : India : Karnataka, Manipur, Maharashtra, Meghalaya, Nagaland, West Bengal.

SUMMARY

The present faunal study is based upon 870 examples of hemipteran insects which may be considered a small collection from a conservation area like Bilgiri Rangasamy Wildlife Sanctuary. Total 49 species under 38 genera of 16 families is a base line data for comparison with other faunal components of the area. Earlier, Distant (1904, 1908, 1910, 1916, 1918) in his Fauna of British India had recorded 58 species under 46 genera from the State of Karnataka of the concerned families, which have been dealt with in this paper. Motschulasky (1863), Shiraki (1912), Dworakowska (1979, 1980a), Dworakowska and Sohi (1978a), Dworakowska and Virakthamath (1979), Virakthamath and Dworakowska (1979) have recorded 8 species under 6 genera of the family Typhlocybidae from the Bilgirirangan hills, Karnataka.

REFERENCES

- BISWAS, B., GHOSH, M. and BASU R.C. 1994. Insecta : Hemiptera : Homoptera : Ceropoidea, Fauna of West Bengal, State Fauna Series, 5(Part-5) : 1-27.
- BISWAS, B., BASU, R.C. and GHOSH, M. 1994. Insecta : Homoptera, Membracidae. In : Fauna of West Bengal, State Fauna Series, 3(Part-5) : 79-90.
- CHAKRABORY, S.P., GHOSH L.K. and BASU, R.C. 1994. Insecta : Hemiptera : Pentatomoidae. In : Fauna of West Bengal, State Fauna Series, 3(Part-5) : 469-493.

- DISTANT, W.L. 1904. *The Fauna of British India including Ceylon & Burma, Rhynchota*, 1 : 1-438.
- DISTANT, W.L. 1904, *ibid.*, 2 : 1-93.
- DISTANT, W.L. 1908, *ibid.*, 4 : 1-501.
- DISTANT, W.L. 1910, *ibid.*, 5 : 1-91.
- DISTANT, W.L. 1916, *ibid.*, 6 : 1-248.
- DISTANT, W.L. 1918, *ibid.*, 7 : 1-109.
- GHOSH, M. and GHOSH, L.K. 1994. Insecta : Hemiptera : Cicadellidae. In : *Fauna of West Bengal, State Fauna series*, 3 (Part-5) : 29-68.
- GHOSH, M. and GHOSH, L.K. 1998. Insecta : Homoptera : Cicadellidae. In : *Fauna of Meghalaya, State Fauna Series*, 4(Part-4) : 1-49.
- SEN, G. C., BISWAS, B. and BASU, R. C. 1994. Insecta : Hemiptera : Heteroptera : Pyrrhocoridae. In : *Fauna of West Bengal, State Fauna Series*, 3(Part-5) : 433-447.
- DWORAKOWSKA, I. 1980a. On some Typhlocybinae from India (Homoptera : Auchenorrhyncha, Cicadellidae), *Amot. Zool. Bol. Bratislava*, 131 : 1-50.
- DWORAKOWSKA, I. and SHOI. 1980a. On some Typhlocybinae with Remarks on synonymy of India species (Auchenorrhyncha, Cicadellidae), *Bull. Acad. Pol. Sci. CII. Ser. Sci. Biol.*, 26(1) : 35-44.
- DWORAKOWSKA, I., and VIRAKTAMATH, C.A. 1979a. On some India Erythroneurini (Auchenorrhyncha, Cicadellidae, Typhlocybinae), *Bull. Acad. Pol. Sci. CII. Ser. Sci. Biol.*, 27(1) : 49-59.
- MOTSCHULSKY, V.I. 1863. *Es assail'd'un catalogue des insectes de ille Cylon. Soc. Nat. Moscou Bull.*, 36 : 1-153.
- SHIRAKI, T. 1912. Investigation upon insects injurious to cotton. *Formosa Agric. Expt. Sta. Spec. Rept.*, 5 : 1-282.
- VIRAKTAMATH, C.A. and DWORAKOWSKA, I. 1979. Indian species of Singapore (Homoptera, Cicadellidae, Typhlocybinae). *Oriental Ins.*, 13(1-2) : 87-91.

INSECTA : HEMIPTERA (AQUATIC AND SEMI-AQUATIC)

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INTRODUCTION

This study is based on the collections made from the Biligiri Rangaswamy Temple Wildlife Sanctuary which includes 37 species accommodated under 25 genera under 10 families.

Key to the families

1. Antennae conspicuous and visible in dorsal view; inserted in front of eyes, and longer than head; lives on the surface of water, walking or skating; wingless & winged forms (semi-aquatic) 2
- Antennae hidden, not visible in dorsal view; very much shorter than head; lives in submerged water; always winged forms. (aquatic) 5
2. Claws of atleast front tarsi inserted before its tip; tip of last tarsal segment cleft or bifid 3
- Claws of all legs inserted at the tip; tip of last tarsal segment entire 4
3. Hind femora long; surpassing end of abdomen; middle legs inserted closer to hind legs than to fore legs; head with markings, without central groove GERRIDAE
- Hind femora short; not surpassing end of abdomen; middle legs inserted about midway between front and hind legs; head with a central groove VELIIDAE
4. Stick-like insect with thread like legs, body long, head as long as entire thorax; antenna and legs thread like, always winged form, simple ovipositor and not saw-like HYDROMETRIDAE

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- Small, slender, body short, head shorter than thorax; antenna and legs not thread-like, saw-like ovipositor, winged and wingless forms MESOVELIIDAE
- 5. Rostrum short, triangular, not distinctly segmented; front tarsi single-segmented, scoop-like, fringed with setae CORIXIDAE
- Rostrum long, cylindrical, distinctly segmented; fore tarsi one or more-segmented, simple, without setae 6
- 6. Oblong, oval or elongate forms without abdominal appendages, swims upside down 7
- Flattened forms with or without abdominal appendages, swims normally with back towards the water surface 8
- 7. Elongate forms with long oar-like hind legs; hind tibia and tarsi ciliated, abdomen with a mid ventral keel NOTONECTIDAE
- Oval forms, all legs simple and alike, hind tibia and tarsi not ciliated, abdominal ventral without keel PLEIDAE
- 8. Tip of the abdomen with a long and slender siphon NEPIDAE
- Tip of the abdomen without a long and slender siphon 9
- 9. A distinctive pair of flat retractile strap-like appendages at the apex of abdomen; size ranges from 15 to 100 mm BELOSTOMATIDAE
- No distinctive appendages at the apex of abdomen; fore leg raptorial, size less than 15 mm NAUCORIDAE

SYSTEMATIC LIST

Infraorder NEPOMORPHA

Family NOTONECTIDAE

Subfamily ANISOPINAE

Genus *Anisops* Spinola

1. *Anisops paranigrolineatus* Brooks

2. *Anisops sardaeus* Herrich-Shaffer

Subfamily NOTONECTINAE

Tribe Notonectini

Genus *Enithares* Spinola

3. *Enithares ciliata* (Fabricius)

4. *Enithares hungerfordi* Brooks

- Family BELOSTOMATIDAE
 Subfamily LETHOCERINAE Lauck & Menke
 Genus *Lethocerus* Mayr
 Subgenus *Lethocerus* Mayr
5. *Lethocerus indicus* (Lepeletier & Serville)
 Family NEPIDAE
 Subfamily RANATRINAЕ Douglas & Scott
 Tribe Ranatrini Douglas & Scott
 Genus *Cercotmetus* Amyot & Serville
6. *Cercotmetus fumosus* Distant
7. *Cercotmetus pilipes* Dallas
 Genus *Ranatra* Fabricius
8. *Ranatra elongata* Fabricius
9. *Ranatra filiformis* Fabricius
 Subfamily NEPINAE Latreille
 Tribe Nepini Latreille
 Genus *Laccotrephes* Stål
10. *Laccotrephes griseus* (Guerin-Meneville)
11. *Laccotrephes ruber* (Linnaeus)
 Family PLEIDAE
 Genus *Paraplea* Esaki & China
12. *Paraplea* sp.
 Family NAUCORIDAE Leach
 Subfamily LACCOCORINAE Stål
 Genus *Heleocoris* Stål
13. *Heleocoris bergerothi* Montandon
 Family CORIXIDAE
 Subfamily CORIXINAE
 Tribe Corixini
 Genus *Sigara* Fabricius
 Subgenus *Tropocorixa* Hutchinson
14. *Sigara (Tropocorixa) graveleyi* (Hutchinson)
15. *Sigara (Tropocorixa) horana* (Hutchinson)

Subfamily MICRONECTINAE

Genus *Micronecta* KirkaldySubgenus *Indonectella* Hutchinson

- 16.
- Micronecta (Indonectella) grisea*
- (Fieber)

Subgenus *Sigmonecta* Wróblewski

- 17.
- Micronecta (Sigmonecta) quadristrigata*
- Breddin

Subgenus *Basilonecta* Hutchinson

- 18.
- Micronecta (Basilonecta) scutellaris scutellaris*
- (Stål)

Subgenus *Dichaetonecta* Hutchinson

- 19.
- Micronecta (Dichaetonecta) desertana dravida*
- Hutchinson

Infraorder GERROMORPHA

Family GERRIDAE

Subfamily CYLINDROSTETHINAE

Genus *Cylindrostethus* Mayr

- 20.
- Cylindrostethus productus*
- (Spinola)

Subfamily EOTRECHINAE

Genus *Onychotrechus* Kirkaldy

- 21.
- Onychotreches rhexenor*
- (Kirkaldy)

Genus *Amemboa* EsakiSubgenus *Amemboa* Esaki

- 22.
- Amemboa (Amemboa) kumari*
- (Distant)

Subfamily GERRINAE

Genus *Limnogonus* StålSubgenus *Limnogonus* Stål

- 23.
- Limnogonus (Limnogonus) nitidus*
- (Mayr)

Genus *Limnometra* Mayr

- 24.
- Limnometra fluviorum*
- (Fabr.)

- 25.
- Limnometra anadyomene*
- (Kirkaldy)

Genus *Neogerris* Matsumura

- 26.
- Neogerris parvula*
- (Stål)

Subfamily HALOBATINAE

Genus *Metrocoris* Mayr

- 27.
- Metrocoris malabaricus*
- Thirumalai

28. *Metrocoris communis* (Distant)

Subfamily PTILOMERINAE

Genus PTILOMERA Amyot & Serville

Subgenus PTILOMERA Amyot & Serville

29. *Ptilomera (Ptilomera) agroides* Schmidt

Subfamily RHAGADOTARSINAE

Genus *Rhagadotarsus* BreddinSubgenus *Rhagadotarsus* Breddin30. *Rhagadotarsus (Rhagadotarsus) kraepelini* Breddin

Subfamily TREPOBATINAE

Genus *Naboandelus* Distant31. *Naboandelus signatus* DistantGenus *Ventidius* DistantSubgenus *Ventidius* Distant32. *Ventidius (Ventidius) aquaris* Distant

Family VELIIDAE

Subfamily HALOVELIINAE

Genus *Strongylovelia* Esaki33. *Strongylovelia* sp. (Could turn into new to science)

Subfamily MICROVELIINAE

Genus *Microvelia* WestwoodSubgenus *Microvelia* Westwood34. *Microvelia (Picaultia) douglasi* Scott

Family MESOVELIIDAE

Subfamily MESOVELIINAE

Genus *Mesovelia* Mulsant & Rey35. *Mesovelia vittigera* Horvath

Family HYDROMETRIDAE

Subfamily HYDROMETRINAE

Genus *Hydrometra* Latreille36. *Hydrometra butleri* Hungerford and Evans37. *Hydrometra greeni* Kirkaldy

SYSTEMATIC ACCOUNT

Family NOTONECTIDAE

Subfamily ANISOPINAE

Key to the species of *Anisops*

- Fusiform species; synthlipsis wide, one third or more than the anterior width of vertex; anterior margin of vertex without a cephalic projection in male
..... *Anisops paranigrolineatus* Brooks
- Robust species; synthlipsis narrow, less than one third the anterior width of vertex; anterior margin of vertex with a long & acuminate cephalic projection in male
..... *Anisops sardus* Herrich-Shaffer

1. *Anisops paranigrolineatus* Brooks

1951. *Anisops paranigrolineata*, Brooks, Kans. Univ. Sci. Bull., 34 : 407

2001. *Anisops paranigrolineata*, Brooks : Thirumalai, ZSI, Fauna of Conservation Area, 11 : 117.

Diagnosis : The interocular space is not swollen, the left paramere in male is little excavate.

Material examined : 1 ♂, 1 ♀ from Doddachempige, 25.ii.1999, coll. S. Krishnan; 18 ♂, 17 ♀ from Kalani road, 2.iv.1999, Coll. G. Thirumalai; 9 ♂, 10 ♀ from Sebinakare to Duraisanialla, 27.ii.2000, Coll. G. Thirumalai; 1 ♂ from Parashukatta, 28.ii.2000, Coll. G. Thirumalai and 14 ♂, 40 ♀ from Doddasempige, 2.iii.2000, Coll. G. Thirumalai.

Distribution : India : Kerala, Maharashtra, Tamilnadu, Uttar Pradesh.

Remarks : It is so far known only from India and has a remarkable distribution in being restricted so far to Maharashtra, Tamilnadu and Uttar Pradesh.

2. *Anisops sardus* Herrich-Shaffer

1849. *Anisops sardus* Herrich-Shaffer, Die wanzenartigen Insecten, 9 : 41.

2001. *Anisops sardus* Herrich-Shaffer : Thirumalai, ZSI, Fauna of Conservation Area, 11 : 117.

Diagnosis : This is a moderately larger species (more than 7.3mm) with the male having a cephalic projection, the two basal tibial setae of anterior legs in male spatulate and the left paramere deeply excavate. The ovipositor of female with the longitudinal teeth and lateral tooth-like setae.

Material examined : 1 ♂, 1 ♀ from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai

Distribution : India : Bihar, Chandigarh, Delhi, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamilnadu, Uttar Pradesh, West Bengal.

Elswehere : Afghanistan; Africa; Albania; Canary Islands; Myanmar; Syria; Turkey.

Remarks : It has a wide distribution. It is known to occur in Mediterranean countries and Western Asia and also widely distributed in Ethiopian, Oriental and southern Palaearctic regions.

Subfamily NOTONECTINAE

Key to the species of *Enithares*

- Length not more than 10.0mm; metasternal xiphus blunt at apex; mesotrochanter with a patch of black spicules ventrally *Enithares ciliata* (Fabricius)
- Length not more than 14.0mm; metasternal xiphus acute at apex; mesotrochanter with long & thin hairs ventrally *Enithares hungerfordi* Brooks

3. *Enithares ciliata* (Fabricius)

1798. *Notonecta ciliata* Fabricius, *Suppl. Ent. Syst.*, 524.
 1906. *Enithares indica* Spinola : Distant, *Fauna British India*, 3 : 42.
 1910. *Enithares paviana* Distant, *Fauna British India*, 5 : 329.
 1919. *E. lacta* Paiva, *Rec. Indian Mus.*, 19 : 155.
 1938. *E. abbreviata* (Kirby) : Hafiz and Mathai, *Rec. Indian Mus.*, 40 : 210.

Diagnosis : The mesotrochanter is rounded with a patch of black spicules along the ventral margin, covering a much larger area. This species, like the other known species of the genus, is found on water surface and usually feeds on prey caught in the surface film or floating at the surface of deep water or clinging to submerged objects.

Material examined : 1♂ from Kombarmathi, 26.ii.1999, coll. S. Krishnan; 2♂, 1♀ from Sebinakare to Duraisanialla, 27.ii.2000, Coll. G. Thirumalai and 12♂, 4♀ and 5Is from Doddasempige, 2.iv.2000, Coll. G. Thirumalai.

Distribution : India : Andaman & Nicobar Islands, Andhra Pradesh, Bihar, Goa, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Tamilnadu, West Bengal.

Elsewhere : Bhutan.

4. *Enithares hungerfordi* Brooks

1941. *Enithares hungerfordi* Brooks, *J. Kans. Ent. Soc.*, 21 : 41
 2001. *Enithares hungerfordi* Brooks : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 115.

Diagnosis : The basal width of the metaxyphus equals the median length. The males of *Enithares hungerfordi* lack a flap on the forefemora near the back of the trochanters.

Material examined : 1♂ from Girialla, 22.ii.1999, Coll. G. Thirumalai; 4♀ from Doddachempige, 25.ii.1999, coll. S. Krishnan; 1♂, 1♀ from Kombarmathi, 26.ii.1999, coll. S. Krishnan; 1♂, 3♀, 1ls from Kenkere, 1.iii.1999, Coll. G. Thirumalai; 8♂, 6♀, 2 ls from Kalani road, 2.iv.1999, Coll. G. Thirumalai; 2♂, 4♀ from Basavanagodu, 3.iv.1999, Coll. G. Thirumalai; 1♀ from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai; 1♀ from Dodithagadu, 5.iv.1999, Coll. G. Thirumalai; 1♂, 4♀, 2 ls from Sebinakare to Duraisanialla, 27.ii.2000, Coll. G. Thirumalai; 3♂, 5♀ from Biligiri Rangaswamy Temple Hills, 29.ii.2000, Coll. G. Thirumalai and 1♂, 2♀ from Doddasempige, 2.iii.2000, Coll. G. Thirumalai.

Distribution : India : Kerala and Tamilnadu.

Remarks : Out of the five species so far known from India, *E. hungerfordi* along with *E. fusca* Brooks so far restricted to southern part of India. The distribution records so far revealed that this species has been found in Western and Eastern Ghats.

Family BELOSTOMATIDAE

Subfamily LETHOCERINAE

5. *Lethocerus indicus* (Lepeletier & Serville)

- 1775. *Belostoma indica* Lepeletier & Serville, *Encycl. Meth.*, X : 272
- 1871. *Belostoma indicum* Lepeletier & Serville, Mayr, *Verh. zool.-bot. Ges. Wien*, 12 : 426.
- 1927. *Lethocerus indicus* (Lep. & Serv.) : Buneo, *Bull. Brooklyn Entomol. Soc.*, 12 : 30
- 2001. *Lethocerus indicus* (Lep. & Serv.) : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 119

Diagnosis : The 'giant Indian water bug' large, elongate, dorsoventrally flattened brown aquatic bug; divergent yellow line on anterior lobe of pronotum broad; eyes twice as long as wide and elongate. Members of this genus are found in deeper water bodies such as pond, lakes, flooded paddy fields etc.

Material examined : 1♂ from Kalani road, 2.iv.1999, Coll. G. Thirumalai.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Delhi, Karnataka, Kerala, Meghalaya, Madhya Pradesh, Maharashtra, Mizoram, Orissa, Punjab, Rajasthan, Tamilnadu, Uttar Pradesh, West Bengal.

Elsewhere : China; Indonesia; Malaysia; Myanmar; Pakistan; Srilanka.

Family NEPIDAE

Subfamily RANATRINAE

Key to the species of *Cercotmetus*

- Length not more than 40 mm *Cercotmetus pilipes* Dallas
- Length atleast 48 mm *Cercotmetus fumosus* Distant

6. *Cercotmetus fumosus* Distant

1904. *Cercotmetus fumosus* Distant, *Entomologist*, 37 : 278.

2001. *Cercotmetus fumosus* Distant : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 118.

Diagnosis : Long, 48mm; vertex with prominent tubercle; respiratory siphon two and a half times longer than the operculum; operculum narrow and carinate.

Material examined : 1♀, Road from Parashukatta to Budipaduga, 28,ii, 2000, Coll. G. Thirumalai.

Distribution : India : Bihar, Himachal Pradesh, Orissa, Tamilnadu, Uttar Pradesh.

Elsewhere : Sri Lanka.

Remarks : Species belonging to this genus are poorly known in India.

7. *Cercotmetus pilipes* (Dallas)

1850. *Ranatra (Cercotmetus) pilipes* Dallas, *Trans. R. ent. Soc. Lond.*, 1 : 9.

1903. *Cercotmetus pilipes* (Dallas) : Montandon, *Bull. Soc. ti. Buck.*, 12 : 110.

1997. *C. pilipes* (Dallas) : Bal & Basu, *Zool. Surv. India, State Fauna Series*, 6 : 267

Diagnosis : Length not more than 40mm; vertex with very distinct tubercle; antennae in male with stout spines sparsely arranged; middle and hind tibia with dense fringes of hairs; mesonotum with carination posteriorly.

Material examined : 1♂ from Budipaduga, 18.ii.1999, Coll. S. Krishnan.

Distribution : India : Delhi, Karnataka, Kerala.

Elsewhere : Bhutan.

Subfamily RANATRINAE

Key to the species of *Ranatra*

Large body size (38-57mm); respiratory siphon longer than the body
..... *Ranatra elongata* Fabricius

Small body size (20-26mm); respiratory siphon shorter than the body
..... *Ranatra filiformis* Fabricius

8. *Ranatra elongata* Fabricius

1790. *Ranatra elongata* Fabricius, 1790, *Skrif. Nat. Selesk.*, 1 : 228.

2001. *Ranatra elongata* Fabricius : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 118.

Diagnosis : This species can be identified by the structure of the anterior femur, which is provided with a triangular tooth beyond the middle of its length, and the metasternal process, which is subtriangular and centrally longitudinally foveately sulcate. The forecoxae are two-thirds of the length of prothorax and anterior lobe of prothorax less than twice the length of posterior lobe.

Material examined : 1♂ from Girialla, 22.ii.1999, Coll. S. Krishnan, 10♂, 8♀ and 3 Is, 7 km from K. Gudi to Biligiri, 24.ii.1999, Coll. S. Krishnan, 1♀ from Dodithagadu, 5.iv.1999, Coll. S. Krishnan; 1♂ from Parashukatta to Budipaduga, 28.ii.2000, Coll. G. Thirumalai and 1♂, 2♀ from Doddasempige, 2.iii.2000, Coll. G. Thirumalai

Distribution : India : Andhra Pradesh, Bihar, Chandigarh, Delhi, Jammu& Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Pondicherry, Punjab, Rajasthan, Tamilnadu, Uttar Pradesh, West Bengal.

Elsewhere : Australia; Nepal; Sri Lanka.

Remarks : This species feeds on tadpoles, nymph of mayflies and other aquatic hemipteran groups and during dry seasons migrates in search of suitable areas.

9. *Ranatra filiformis* Fabricius

1790. *Ranatra filiformis* Fabricius, *Skrift. Nat. Selsk.*, 1 : 228.

2001. *Ranatra filiformis* Fabricius : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 118.

Diagnosis : The males of this species can be identified by the absence of a tooth and presence of several small spines on the inner margins of distally hook-shaped paramere and presence of wide interocular space. This species is smaller in size than *R. elongata*.

Material examined : 3♀ from Kenkare, 25.ii.1999, Coll. S. Krishnan; 1♂ from BR hills, 1.iii.1999, Coll. S. Krishnan; 7♂, 4♀, 1 Is from Parashukatta to Budipaduga, 28.ii.2000, Coll. G. Thirumalai and 1♂ from Doddasempige, 2.iii.2000, Coll. G. Thirumalai.

Distribution : India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Delhi, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Manipur, Meghalaya, Orissa, Pondicherry, Punjab, Rajasthan, Tamilnadu, Uttar Pradesh, West Bengal.

Elsewhere : China; Nepal; Pakistan; Philippines; Sri Lanka.

Remarks : This species is mostly found among vegetation, fringing the shallower parts of water, clinging to submerged vegetation and feeds on nymphs of dragonflies and mosquito pupae.

Subfamily NEPINAE

Key to the species of *Laccotrephes*

1. Small, not exceeding 20 mm length; prosternum strongly acute along. The median line *Laccotrephes griseus* (Guerin)
- Large, more than 20 mm length; prosternum convex ... *Laccotrephes ruber* (Linnaeus)

10. *Laccotrephes griseus* (Guerin)

1844. *Nepa griseus* Guerin, *Iconogr. Regne. Anim.*, : 352.
 1910. *Laccotrephes griseus* (Guerin): Distant, *Fauna British India*, 5 : 314.
 2001. *Laccotrephes griseus* (Guerin) : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 118.

Diagnosis : This species can be identified by the presence of slightly hooked and symmetrical parameres, abdominal appendages shorter than the body, presence of an obtusely rounded tooth at the base of the anterior femora.

Material examined : 2♂, 1♀ from Kenkare, 25.ii.1999, Coll. S. Krishnan; 1♂ 1♀ from Kalani road, 2.iv.1999, Coll. G. Thirumalai; 1♀ Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai; 1♂, 3♀ from Parashukatta to Budipaduka, 28.ii.2000, Coll. G. Thirumalai and 1♂ from Doddasempige, 2.iii.2000, Coll. G. Thirumalai.

Distribution : India: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chandigarh, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Pondicherry, Punjab, Rajasthan, Tamilnadu, Uttar Pradesh, West Bengal.

Elsewhere : Malaysia; Myanmar; Seychelles; Srilanka; Thailand.

Remarks : This species is commonly found in Peninsular India. It is a very sluggish species often found under weeds or at the bottom of slow or stagnant waters.

11. *Laccotrephes ruber* (Linnaeus)

1764. *Nepa ruber*, Linnaeus, *Mus. Lud. Ulr.*, 165.
 1906. *Laccotrephes ruber* (Linn.) : Distant, *Fauna British India*, 3 : 18.
 1994. *Laccotrephes ruber* (Linn.) : Thirumalai, *Rec. zool. Surv. India, Occ. Pap.* No., 165 : 22.

Diagnosis : This is a common species with wide distribution in the Indo-Australian region and is largely found in habitats like rivers, streams, tanks, etc. The abdominal appendices are distinctly longer than the body, the prosternum is convex in the middle and has a curved and hook-shaped male paramere.

Material examined : 1♀ from Kadakkina gandi, Bedgudi, 21.ii.1999, Coll. S. Krishnan; 5♂, 4♀ from Kenkare, 25.ii.1999, Coll. S. Krishnan; 5♂, 4♀ from BR hills, 1.iii.1999, Coll. S. Krishnan; 3♂, 1♀ from Basavanagodu, 3. iv. 1999, Coll. G. Thirumalai; 1♀ from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai; 4♀ from Sebinakare to Duraisanialla, 27.ii.2000, Coll. G. Thirumalai; 1♀ from Biligiri Rangaswamy Temple Hills, 29.ii.2000, Coll. G. Thirumalai and 1♀ from foot hills, K. Gudi, 1.iii.2000, Coll. G. Thirumalai.

Distribution : India : Arunachal Pradesh, Assam, Bihar, Chandigarh, Delhi, Gujarat,

Himachal Pradesh, Jammu and Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Orissa, Tamilnadu, Uttar Pradesh, West Bengal.

Elsewhere : China; Japan; Nepal; Pakistan; Taiwan.

Family PLEIDAE

12. *Paraplea* sp.

Family NAUCORIDAE

Subfamily LACCOCORINAE

13. *Heleocoris bergrothi* Montandon

1897. *Heleocoris bergrothi* Montandon, Verh. Z-b. Ges. Wien, xlvii : 448.

1974. *Heleocoris bergrothi* Montandon : La Rivers, Occ. Pap. Biol. Soc. Nevada, 38.

Diagnosis : Oval, 10mm long; light yellow with black thick spots on the head and pronotum; scutellum black with its tip yellow, a yellow 'V'-shaped discal spot differentiates this species from all known Indian species.

Material examined : 1♂, 1♀, 1Is from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai.

Distribution : India : Karnataka (Present record) and Tamil Nadu.

Family CORIXIDAE

Subfamily CORIXINAE

14. *Sigara (Tropocorixa) graveleyi* (Hutchinson)

1940.. *Corixa (Tropocorixa) graveleyi* Hutchinson, Trans. Conn. Acad. Arts. Sci., 33 : 453.

2001. *Corixa (Tropocorixa) graveleyi* Hutchinson : Thirumalai, ZSI, Fauna of Conservation Area, 11 : 113.

Diagnosis : Pronotum dark brown with ten pale yellow lines; the males are characterized by conspicuous brush-like hairs on the right side of the 8th dorsal abdominal segment.

Material examined : 15♂, 36♀, 25Is from Kalani road, 2.iv.1999, Coll. G. Thirumalai; 2♂, 6♂, 1Is from Basavanagodu, 3.iv.1999, Coll. G. Thirumalai; 8♂, 9♀ from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai; 2♀ from Sebinakare to Duraisanialla, 27.ii.2000, Coll. G. Thirumalai and 3♀, 13♀, 1Is from Biligiri Rangaswamy Temple hills, 29.ii.2000, Coll. G. Thirumalai.

Distribution : India : Goa, Madhya Pradesh, Maharashtra, Tamilnadu.

15. *Sigara (Tropocorixa) horana* (Hutchinson, 1940)

1940. *Corixa (Tropocorixa) horana* Hutchinson, *Trans. Conn. Acad. Arts. Sci.*, 33 : 435.

2001. *Sigara (Tropocorixa) horana* Hutchinson : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 113.

Diagnosis : Strigil (stridulatory comb) present on the right side of the 6th tergite of male, pala (the foreleg) sub-triangular with 24-26 pegs; female difficult to identify without the associated male.

Material examined : 9♂, 13♀ from Kalani road, 2.iv.1999, Coll. G. Thirumalai and 1♂, 1♀ from Parashukatta, 28.ii.2000, Coll. G. Thirumalai.

Distribution : India : Karnataka (present report), Tamilnadu.

Remarks : The type locality of this species is Nilgiris and the present record is the first report outside the type locality.

Subfamily MICRONECTINAE

16. *Micronecta (Indonectella) grisea* (Fieber)

1844. *Sigara grisea* Fieber, *Entomol. Mono. Leipzig*, 14.

1910. *Micronecta thyesta* Distant, *Fauna Brit. India*, 5 : 349.

1940. *M. (Indonectella) thyesta* Distant : Hutchinson, *Trans. Conn. Acad. Art. Sci.*, 33 : 363.

1995. *M. (I) grisea* (Fieber) : Jansson, *Catal. Heter. Palearctic region*, 1 : 30.

2001. *M. (I). thyesta* Distant : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 115.

Diagnosis : It can be differentiated from the known oriental forms by the absence of strigil (stridulatory comb) in males and the distal margin of free lobe of eighth abdominal tergite, deeply emarginated. General colour greyish-yellow with head darkened posteriorly. Head evenly rounded anteriorly.

Material examined : 13♂, 11♀, 2♂ from Parashukatta, 28.ii.2000, coll. G. Thirumalai.

Distribution : India : Andhra Pradesh, Assam, Bihar, Karnataka, Madhya Pradesh, Orissa, Tamilnadu, West Bengal.

Elsewhere : China; Vietnam.

17. *Micronecta (Sigmonecta) quadristrigata* Breddin

1905. *Micronecta quadristrigata* Breddin, *Soc. Ent. Zurich*, 20 : 57.

2001. *Micronecta quadristrigata* Breddin : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 115.

Diagnosis : The eighth abdominal tergite of the males is sigmoid in outline. The seventh abdominal tergite has four, moderately enlarged bristles.

Material examined : 2♂ from Parashukatta, 28.ii.2000, coll. G. Thirumalai.

Distribution : India : Andhra Pradesh, Arunachal Pradesh, Bihar, Karnataka, Kerala, Maharashtra, Orissa, Tamilnadu, West Bengal.

Elsewhere : Indonesia; Iran; Malaysia; Philippines; Srilanka.

Remarks : It is very common in the Southern and Eastern parts of India. It is also reported to occur in brackish water pools. It has also been collected from the backwaters of Madras Coast (salinity 4.2%) by the senior author.

18. *Micronecta (Basilonecta) scutellaris scutellaris* (Stål)

1858. *Sigara scutellaris* Stål, *Vetens akad. Forh.* 15 : 319.

1910. *Micronecta dione* Distant, *Fauna British India*, 5 : 348.

1910. *M. proba* Distant, *Fauna British India*, 5 : 348.

1940. *M. scutellaris scutellaris* (Stål) : Hutchinson, *Trans. Conn. Acad. Arts. Sci.* 33 : 365.

2001. *M. scutellaris* (Stål) : Thirumalai, ZSI, *Fauna of Conservation Area*, 11 : 115.

Diagnosis : *M. scutellaris* is the largest Indian species of *Micronecta* (3.0–3.02 mm). In males, the pronotum is grey or greyish brown, paler margins and with obscure elytral pattern.

Material examined : 1♂, 4♀ from Parashukatta, 28.ii.2000, coll. G. Thirumalai.

Distribution : India: Andhra Pradesh, Assam, Bihar, Chandigarh, Delhi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Tamilnadu, Uttar Pradesh, West Bengal.

Elsewhere : Central Africa; China; Indonesia; Malaysia; Saudi Arabia; Srilanka; Vietnam.

Remarks : This is a very widely distributed species in India and mostly found in stagnant pools, ponds and ditches. It is the most common member and the largest species of the genus.

19. *Micronecta (Dichaetonecta) desertana dravida* Hutchinson

1940. *M (Dichaetonecta) desertana dravida* Hutchinson, *Trans. Conn. Acad. Art. Sci.*, 33 : 392.

2001. *M.(D).desertana dravida* Hutchinson : Thirumalai, ZSI. *Fauna Conservation Area*, 11 : 114.

Diagnosis : Dark brownish yellow; size 2.7 to 2.9 mm; the apex of the right paramere knob like, left paramere without any groove and denticulation.

Material examined : 5♂, 2♀, 2 ls from Dodithagadu, 5.iv. 1999, coll. G. Thirumalai.

Distribution : India : Karnataka, Maharashtra, Tamilnadu.

Elsewhere : Iran; Sri Lanka.

Remarks : This species occurs with different geographical races and with many subspecies.

Infraorder GERROMORPHA

Family GERRIDAE

Subfamily CYLINDROSTETHINAE

20. *Cylindrostethus productus* (Spinola)

1840. *Gerris productus* Spinola, Esaki. *Sur less insectes hemipteres rhynchotes on heteropteres*, 64.

1903. *Cylindrostethus productus* (Spinola) : Distant, *Fauna Brit. India*, 2 : 184.

2002. *Cylindrostethus productus* (Spinola) : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 58.

Diagnosis : This species is very large (more than 25 mm), elongate, dark, which can be recognised by its large connexival spines. *C. productus* is the only member of the genus so far known from India. This species has been found inhabiting smooth flowing mountain streams.

Material examined : 7♂, 4♀ from Budipaduga, 18.ii.1999, Coll. S. Krishnan.

Distribution : India : Karnataka, Kerala, Goa, Himachal Pradesh, Madhya Pradesh, Maharashtra, Orissa, Tamilnadu, Uttaranchal, West Bengal.

Elsewhere : Sri Lanka.

Subfamily EOTRECHINAE

21. *Onychotrechus rhexenor* Kirkaldy

1903. *Onychotrechus rhexenor* Kirkaldy, *Entomologist*, 36 : 44.

2002. *O. rhexenor* Kirk. : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 60.

Diagnosis : Darker brown or black in colour; short brown sublateral stripes on mesonotum in wingless forms; male front femur tapering towards apex, elongate patch of dark spinules on inner surface.

Material examined : 1♂(w) from Basavanagodu, 3.iv.1999, Coll. G. Thirumalai, 1♂(w) from Dodithagadu, 5.iv.1999, Coll. G. Thirumalai and 1♂(w) from Sebinakare to Duraisanialla, 27.ii.2000, Coll. G. Thirumalai.

Distribution : India : Karnataka, Kerala, Maharashtra, Rajasthan, Tamilnadu.

Elsewhere : Africa.

Remarks : *O. rhexenor* lives on inclined rock faces close to mountain streams, rock splashed by waterfalls and similar habitats.

22. *Amemboa (Amemboa) kumari* (Distant, 1910)

1910. *Onychotrechius kumari* Distant, *Ann. Mag. nat. Hist.*, 5 : 145.
 1984. *Amemboa (Amemboa) kumari* (Distant) : Polhemus & Andersen, *Steenstrupia*, 10(3) : 85.
 2002. *Amemboa (Amemboa) kumari* (Distant) : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 58.
 1950. *Amemboa pervati* Pradhan, *Rec. Indian Mus.*, 48(3 & 4) : 12.

Diagnosis : The male forefemur relatively slender, with two separate hair tufts beyond middle, the basal hair tuft small and pointed. The females cannot safely be identified without the associated males.

Material examined : 1♂ (apt.), 1♀ from Sebinakare to Doraisanhalla, 27.ii.1999, Coll. G. Thirumalai; 2♂, 3♀ (apt.) from Basavanagodu, 3.iv.1999, Coll. G. Thirumalai and 1♂, 1♀ (apt.) from the road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai.

Distribution : India : Karnataka, Kerala, Orissa, Tamilnadu.

Remarks : This species is reported to occur in small pools, puddles near the streambeds, or on riverbanks. It has not been so far recorded outside the Indian Peninsula.

Subfamily GERRINAE

23. *Limnogonus (Limnogonus) nitidus* (Mayr)

1865. *Hydrometra nitida* Mayr, *Verh. zool.-bot. Ges. Wien*, 15 : 443.
 1903. *Gerris nitida* (Mayr) : Distant, *Fauna Brit. India*, 2 : 178.
 1908. *Limnogonus nitidus* (Mayr) : Kirkaldy, *Wissenschaft Ergebni. der Schwed. Zool. Exped. nach dem Kilimandjaro*, 12 : 21.
 2002. *L. (Limnogonus) nitidus* (Mayr) : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 62.

Diagnosis : This species has been recorded from temporary pools, rice fields, ponds from sea level to 1000 metres and found as winged individuals. This can be identified from all the known species of this genus by the presence of fairly, prominent connexival spines and yellow markings at the anterior pronotal lobe.

Material examined : 1♂ (w) from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai.

Distribution : India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Bihar, Chandigarh, Delhi, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Rajasthan, Tamilnadu, Tripura, Uttar Pradesh, West Bengal.

Elsewhere : Indonesia; Malaysia; Maldives; Myanmar; Nepal; Singapore; Sri Lanka; Thailand; Vietnam.

Key to the species of *Limnometra*

- Middle coxae with a spine-like projection on the dorsolateral rear margin; head with a central broad black stripe *Limnometra fluviorum* (Fabricius)
- Middle coxae without a spine-like projection on the dorsolateral rear margin; head with an irregular diamond & two lateral stripes *Limnometra anadyomene* (Kirkaldy)

24. *Limnometra fluviorum* (Fabricius)

1798. *Cimex fluviorum* Fabricius, *Ent. Syst. Suppl.*, 543.
 1903. *Gerris fluviorum* (Fabricius) : Distant, *Fauna British India*, 2 : 177
 1958. *L. fluviorum* (Fabricius) : Hungerford & Matsuda, *Kans. Univ. Sci. Bull.*, 39 : 401.
 1960. *Tenagogonus (Limnometra) fluviorum* (Fab.) : Matsuda, *Kans. Univ. Sci. Bull.*, 41 : 206.
 2002. *L. fluviorum* (Fabricius) : Thirumalai, *Rec. zool. Surv. India*, 100 (1-2) : 63.
 1903. *Gerris armata* Spinola : Distant, *Fauna British India*, 2 : 180.

Diagnosis : *L. fluviorum* can easily be identified by the presence of a spine-like projection on the dorsolateral rear margin of middle coxae. This is a very common species found throughout Southern India and also recorded from a wide variety of freshwater habits.

Material examined : 1♂, 1IIs from Kenkare, 25.ii.1999, Coll. S. Krishnan; 1♂ (W) from Doddachempike, 25.ii.1999, Coll. S. Krishnan; 1♀ (winged) from Kombarmathi, 26.ii.1999, coll. S. Krishnan; 2♂ (w) from Kalani road, 2.iv.1999, Coll. G. Thirumalai and 2♂ (w) from Basavanagodu, 3.iv.1999, Coll. G. Thirumalai.

Distribution : India : Karnataka, Kerala, Maharashtra, Pondicherry, Tamilnadu, West Bengal.

Elsewhere : Philippines; Sri Lanka.

25. *Limnometra anadyomene* (Kirkaldy)

1901. *Gerris anadyomene* Kirkaldy, *Entomologist*, 34 : 117.
 1915. *Tenagogonus anadyomene* (Kirkaldy) : Bergroth, *Zool. Meded. Leiden*, 1(2) : 122.
 1934. *Limnometra anadyomene* (Kirkaldy) : Lundblad, *Arch. Hydrobiol. Suppl.*, 12 : 371.
 1960. *Tenagogonus (Limnometra) anadyomene* (Kirkaldy) : Matsuda, *Kans. Univ. Sci. Bull.*, 41 : 206.
 1995. *Limnometra anadyomene* (Kirkaldy) : Andersen, *Steenstrupia*, 21 : 117.
 1986. *Tenagogonus (Limnometra) longispinulus* (Kirkaldy) : Thirumalai, *Rec. zool. Surv. India*, 84(1-4) : 11.
 2002. *Limerometra anadyomene* (Kirkaldy) : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 63.

Diagnosis : This species can be easily identified by the second tarsal segment of front leg longer than first, middle femur longer than the total body in male and about equal in female; the abdominal connexival spines in males surpassing the first genital segment and not the abdominal tip and never do so in females. It is interesting to note that in this species, females are strikingly broader and larger than males. Its habitat is highly restricted to forest streams.

Material examined : 1♂, 4♀ (apt) and 1♀ (M) from Kalani road, 2.iv.1999, Coll. G. Thirumalai.

Distribution : India : Karnataka, Kerala, Tamilnadu.

Elsewhere : Borneo; Myanmar; Malaya; Philippine Islands; Sri Lanka; Sumatra.

26. *Neogerris parvula* (Stål, 1859)

- 1859. *Gerris parvula* Stål, Zoology, 4 : 265.
- 1939. *Limnogonus parvulus* (Stål) : Hafiz & Riberio, Rec. India Mus., 41 : 427.
- 1959. *L. (Limnogonellus) parvulus* (Stål) : Hungerford & Matsuda, J. Kans. Ent. Soc., 32(1) : 41.
- 1960. *L. (Neogerris) parvulus* (Stål) : Matsuda, Kans. Univ. Sci. Bull., 41 : 114.
- 1975. *Neogerris parvula* (Stål) : Andersen, Ent. Scand. Suppl., 7 : 86.
- 2002. *Neogerris parvula* (Stål) : Thirumalai, Rec. zool. Surv. India, 100(1-2) : 63.
- 1903. *G. tristan* Kirkaldy : Distant, Fauna Brit. India, 2 : 179.

Diagnosis : *N. parvula* is easily separated from all the known species of this genus by the presence of a large round or quadrangular yellow spot on the pronotum. This gerrids enjoy a distribution from the Eastern parts of the Arabian Peninsula to Solomon Island and from Rynku Islands to Java. A very common species found in slow running streams, reservoirs, ponds and rain-fed pools, throughout Indian subcontinent.

Material examined : 1♀ (w) from Basavanagodu, 3.iv.1999, Coll. G. Thirumalai.

Distribution : India : Arunachal Pradesh, Assam, Kerala, Orissa, Pondicherry, Tamilnadu, Uttar Pradesh, West Bengal.

Elsewhere : China; Indonesia; Iran; Japan; Malaysia; Myanmar; New Guinea; Oman; Philippines; Pakistan; Solomon Island; Sri Lanka; Taiwan; Thailand; Vietnam.

Subfamily HALOBATINAE

Key to the species of *Metrocoris*

- Male fore femur swollen & strongly incrassate with sub apical tooth; male segment VIII almost square; female abdominal sternite VII large & constricted laterally
- *Metrocoris communis* (Distant)

- Male fore femur slender without any tooth; male segment VIII semi-circular; female abdominal sternite VII small & smooth not constricted laterally
..... *Metrocoris malabaricus* Thirumalai

27. *Metrocoris malabaricus* Thirumalai

1986. *Metrocoris malabaricus* Thirumalai, Rec. zool. Surv. India, 84 : 22.

2002. *Metrocoris malabaricus* Thirumalai, Rec. zool. Surv. India, 100(1-2) : 67.

Diagnosis : It can easily be recognised by the thick dark band on dorsal half of mesopleura and thick long velvety pilosity. The slender male femur and prominent falciform paramere which extends beyond genital segments are the other distinguishing characters.

Material examined : 5♂, 6♀ (Apt) from Kadakkinakandi, 21.ii.1999, Coll. S. Krishnan and 1♂, 12♀ from Dodithagadu, 5.iv.1999, Coll. G. Thirumalai.

Distribution : India : Karnataka, Kerala.

28. *Metrocoris communis* (Distant)

1910. *Euodus communis* Distant, Ann. Mag. nat. Hist., 5(8) : 151.

1929. *Metrocoris communis* (Distant) : Esaki, Ann. Mag. nat. Hist. Soc., 4(10) : 419.

2002. *Metrocoris communis* (Distant) : Thirumalai, Rec. zool. Surv. India, 100(1-2) : 65.

Diagnosis : A small (4.5 to 5.8 mm) oval, black and yellow water strider with black marking on dorsal side of head and thorax. The pronotum of wingless forms with 'T'-shaped black pattern and the winged form with a median black longitudinal stripe almost reaching tip with a pair of lateral black stripes on posterior lobe. The 7th ventral segment of female with a tuft of dark brown hairs on either side laterally. *M. communis* found abundant in still or smooth flowing shaded streams, where they stroke and glide across the surface.

Material examined : 1♀ (Apt.) from Kombarmathi, 26.ii.1999, coll. S. Krishnan; 2♂, 1♀ and 1 ls from Kalani road, 2.iv.1999, Coll. G. Thirumalai.

Distribution : India : Chandigarh, Himachal Pradesh, Karnataka, Maharashtra, Meghalaya, Orissa, Punjab, Tamilnadu, Uttaranchal, Uttar Pradesh.

Elsewhere : Afghanistan; Iran; Iraq; Oman.

Subfamily PTILOMERINAE

29. *Ptilomera* (*Ptilomera*) *agroides* Schmidt

1926. *Ptilomera agroides* Schmidt, Ent. Mitt., 15(1) : 63.

1903. *Ptilomera laticaudata* (Hardwicke) : Distant, *Fauna Brit. India*, 2 : 185 (Fig. 133).
1926. *Ptilomera lachne* Schmidt, *Ent. Mitt.*, 15(1) : 64.
1960. *Ptilomera (Ptilomera) agroides* Schmidt : Matsuda, *Kans. Univ. Sci. Bull.*, 41(2) : 269.
2002. *Ptilomera (Ptilomera) agroides* Schmidt : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 69.

Dingnosis : The long dorsolateral projection of pygofer, which extends half its length beyond lateral wings of suranal plate as viewed from above, separates this species from all other known species. The distal half of middle femur bears a dense brush of long hairs. The connexival spine of female arising from beneath the connexival edge of the seventh abdominal segment near its base.

Material examined : 5♂, 16♀ (apt.), 3 Is from Kadakkina gandi, Bedgudi, 21.ii.1999, Coll. S. Krishnan; 2♂, 3♀ from Girialla, 22.ii.1999, Coll. S. Krishnan; 5♂, 6♀, 1 Is from Doddachempike, 25.ii.1999, Coll. S. Krishnan; 1♂, 1♀ from Kombarmathi, 26.ii.1999, Coll. S. Krishnan; 2♂, 4♀, 3Is from Kenkere, 1.iii.1999, Coll. S. Krishnan; 1♂, 5♀ (apt.) from Basavanagodu, 3.iv.1999, Coll. G. Thirumalai, 3♀ (apt.) from Dodithagadu, 5.iv.1999, Coll. G. Thirumalai; 3♂, 2♀ (apt.), 2 Is, from Sebinakare to Doraisanhalla, 27.ii.2000, Coll. G. Thirumalai; 3♂, 1♀ (apt.) from Biligiri Rangaswamy Temple Hills, 29.ii.2000, Coll. G. Thirumalai; 3♂, 3♀ (apt.) from Doddasempige, 2.iii.2000, Coll. G. Thirumalai and 14♂, 9♀ from K. Gudi-Sebinakare, 7.iv.2000, Coll. S. Krishnan.

Distribution : India : Karnataka, Kerala, Maharashtra, Tamilnadu.

Remarks : This species is so far known only from Southern India.

Subfamily RHAGADOTARSINAE

30. *Rhagadotarsus (Rhagadotarsus) kraepelini* Breddin

1905. *Rhagadotarsus karaepelini* Breddin, *Mitt. Nat. Mus. Hamburg*, 22 : 137.
1910. *Nacebus duk* Distant, *Ann. Meg. Nat. Hist.*, 5 : 153.
2002. *Rhagadotarsus karaepelini* Breddin : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 70.

Diagnosis : The body colour is black. The eighth abdominal segment in males is cylindrical, strongly longitudinally depressed ventrally. The female genitalia is having a well formed saw-like ovipositor. This species is always found on the calm surface of ponds and lakes. Andersen & Foster (1992) has recorded *R. kraepelini* on the surface of sheltered ponds of brackish water in Kerala.

Material examined : 1♂ (apt.), 2 Is from Parashukatta, 28.ii.2000, Coll. G. Thirumalai.

Distribution : India (widely distributed)

Elsewhere : China; Indonesia; Malaysia; Myanmar.

Subfamily TREPOBATINAE

31. *Naboandelus signatus* Distant

1910. *Naboandelus signatus* Distant, *Ann. Mag. Nat. Hist.*, 5 : 152.

2002. *Naboandelus signatus* Distant : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 71.

Diagnosis : Body short and somewhat oval. Size of male (apterous) 1.9 to 2.1 mm; female (apterous) 2.1 to 2.4 mm; there is a large black spot surrounded by brownish area on dorsal side of the head; pronotum is with a median yellow spot. Second genital segment with lateral process prominent. This species has been reported from stagnant pond. However, this species was also recorded from a perennial river from South India by the senior author.

Material examined : 2♂, 3♀ (apt.), 4 ls from Parashukatta, 28.ii.2000, Coll. G. Thirumalai.

Distribution : India (Chandigarh, Karnataka, Pondicherry, Tamilnadu, Tripura, Uttar Pradesh, West Bengal).

32. *Ventidius (Ventidius) aquarius* Distant

1910. *Ventidius aquarius* Distant, *Ann. Mag. nat. Hist.*, 5(8) : 150.

1960. *Ventidius (Ventidius) aquarius* Distant : Hungerford & Matsuda, *Kans. Univ. Sci. Bull.*, 40(7) : 324.

2002. *Ventidius (Ventidius) aquarius* Distant : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 67.

Diagnosis : Eyes overlapping anteriolateral angles of mesonotum, antennal segments 2nd and 3rd are equal in length, body oval and ochraceous, with 'T'-shaped black marking on pronotum in winged form; venter pale brown.

Material examined : 2 ls from Budipaduga, 28.ii.2000, Coll. G. Thirumalai.

Distribution : India : Karnataka, Kerala, Tamilnadu.

Remarks : This species is commonly found in lotic habitat in the higher ranges of Kerala and Tamilnadu parts of Western Ghats (altitude between 400-2160 m).

Family VELIIDAE

Subfamily HALOVELIINAE

33. *Strongylovelia* sp.

Subfamily MICROVELIINAE

34. *Microvelia (Picaultia) douglasi* Scott

1874. *Microvelia douglasi* Scott, *Ann. Mag. nat. Hist.*, 14 : 448.

1903. *Microvelia repentina* Distant, *Fauna Brit. India*, 3 : 174.
 1909. *M. kumaonensis* Distant, *Ann. Mag. nat. Hist.*, 3(8) : 500
 1995. *Microvelia (Microvelia) douglasi* Distant : Andersen, *Cat. Het. Palaearctic Region*, 1 : 87.
 2002. *Microvelia (Microvelia) douglasi* Scott : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 73.
 2003. *Microvelia (Picaultia) douglasi* Scott : Andersen & Weir, *Invertebrate systematics*, 17 : 339.

Diagnosis : Fourth antennal segment longest in males, tibial comb present only in foretibia and the interemedise tibiae distinctly smaller than femora.

Material examined : 11♂, 9♀ from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai; 2♂, 1♀ from Dodithagadu, 5.iv.1999, Coll. G. Thirumalai and 1♀ from Doddasempige, 2.iii.2000, Coll. G. Thirumalai.

Distribution : India : Andaman & Nicobar Islands, Arunachal Pradesh, Bihar, Chandigarh, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Orissa, Pondicherry, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal.

Elsewhere : Indonesia; Japan, Sri Lanka.

Family MESOVELIIDAE

Subfamily MESOVELIINAE

35. *Mesovelia vittigera* Horvath

1895. *Mesovelia vittigera* Horvath, *Rev. Entomologie*, 14 : 160;
 1901. *M. orientalis* Kirkaldy, *Ann. Mus. Civ. Genova*, 20 : 808;
 1903. *M. mulsanti* White: Distant, *Fauna Brit. India*, 2 : 169
 1933. *M. orientalis* Kirkaldy : Lundblad, *Arch. Hydrobiol. Suppl.*, 12 : 186.
 1980. *M. vittigera* Horvath : Andersen & Polhemus, *Ent. Scand.*, 11 : 290.
 1989. *Mesovelia vittigera* Horvath : Thirumalai, *Rec., zool. Surv. India, Occ. Pap. No.*, 118 : 35.
 2002. *Mesovelia vittigera* Horvath : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 79.

Diagnosis : The species has a very wide distributional range viz., South Europe, Eastern Palaearctic, Ethiopian, Orient, Australia, Oceania, eastward to Samoa Islands. The ventral abdominal segment in males possesses a group of median spines and two sets of brush-like hairs laterally. The middle femur in females is spiny below. They prefer stagnant or slow running water covered by emergent or floating vegetation.

Material examined : 1♂, 1♀ from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai; 1♂, 1♀ from Dodithagadu, 5.iv.1999, Coll. G. Thirumalai and 4? from Doddasempige, 2.iii.2000, Coll. G. Thirumalai.

Distribution : India (Very widely distributed).

Elsewhere : Africa; Australia; Egypt; Indonesia; Malaysia; Palestine; Philippines; Syria; Samoa Islands; Sri Lanka.

Family HYDROMETRIDAE

Subfamily HYDROMETRINAE

Key to the species of *Hydrometra*

- The terminal dorsal process one half as long as the sixth abdominal segment; 6th abdominal segment swollen ventrally *Hydrometra butleri* Hungerford & Matsuda
- The terminal dorsal process not proportionate; 6th abdominal segment normal and not swollen *Hydrometra greeni* Kirkaldy

36. *Hydrometra butleri* Hungerford and Evans

1934. *Hydrometra butleri* Hungerford and Evans, *Ann. Mag. nat. Hist.*, 28 : 71.

2002. *Hydrometra butleri* Hungerford and Evans : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 79.

Diagnosis : It can easily be distinguished by the swollen ventral sixth abdominal segment; a brush or stiff hair extends to the posterior margin in males. The male parameres are symmetrical. The terminal dorsal process is sharp, long and about one half as long as the 6th abdominal segment in both the sexes.

Material examined : 1♂ from Parashukatta, 28.ii.2000, Coll. G. Thirumalai and 1♂ from Doddasempige, 2.iii.2000, Coll. G. Thirumalai.

Distribution : India : Karnataka, Kerala, Orissa, Tamilnadu.

37. *Hydrometra greeni* Kirkaldy

1898 *Hydrometra greeni* Kirkaldy, *Entomologist*, 31 : 2.

1903 *Hydrometra vittata* (Stål) : Distant, *Fauna British India*, 2 : 170.

2002 *Hydrometra greeni* Kirkaldy : Thirumalai, *Rec. zool. Surv. India*, 100(1-2) : 79.

Diagnosis : Anteclypeus conical, seventh abdominal strigite in male with a deep depression, fringed with short stiff hairs. In India this species occurs from near sea level to over 1500 meters elevation. Its habitats include ponds, swampy areas, rocky up and low land streams, lakes, flooded paddy fields.

Material examined : 1♀ from Basavanagodu, 3.iv.1999, Coll. G. Thirumalai and 1♂ from Road to Sebinakare, 4.iv.1999, Coll. G. Thirumalai.

Distribution : India (Very Widely distributed).

Elsewhere : Bangladesh; China; Nepal; Sri Lanka; Sumatra; Thailand; Vietnam.

SUMMARY

Biligiri Rangaswamy Templewildlife Sanctuary is considered as the biogeographic bridge of the Deccan plateau by geologists (Ganeshaiah and Uma Shaankar, 1998). The report of 37 species of water bugs belonging to 10 families constitutes the first record of this group from this Wildlife Sanctuary of Karnataka state. Eventhough some information on a few families of aquatic bugs is available (Thirumalai, 2001; 2002; 2003; Thirumalai and Krishnan, 2000; Zettel and Thirumalai, 2001a,b), the present study documents authentically 14% or 55% of aquatic bugs diversity of India and from Karnataka respectively. Since 37 species of water bugs are collected and identified from this Wildlife Sanctuary, it is inferred that more systematic sampling efforts will yield more species from this 'biological bridge' of Eastern and Western Ghats.

REFERENCES

- ANDERSEN, N.M. 1995. Infraorder Gerromorpha Popov, 1971-Semi-aquatic bugs, in B.Aukema & C. Riger (eds.), *Catalogue of the Heteroptera of the Palearctic Region. Netherlands Entomological Society, Amsterdam*, 1 : 77-114.
- ANDERSEN, N.M. and W.A. FOSTER. 1992. Sea skaters of India, Sri Lanka and Maldives, with a new species and revised key to Indian Ocean species of *Halobates* and *Asclepios* (Hemiptera : Gerridae). *J. nat. Hist.*, 26 : 533-553.
- GANESHAIAH, K.N. and R. UMA SHAANKAR. 1998. Biligiri Rangaswamy Temple Sanctuary : A Biogeographic Bridge of the Deccan Plateau. Biligiri Rangaswamy Templewildlife Sanctuary, Natural history, Biodiversity and Conservation, ATREE and VGKK publication : 4-6.
- THIRUMALAI, G. 2001. Insecta-Aquatic and semi-aquatic Heteroptera. *Fauna of Nilgiri Biosphere Reserve, Fauna of Conservation Area*, 11 : 111-127. (Published-Director, Zoological Survey of India, Kolkata)
- THIRUMALAI, G. 2002. A checklist of Gerromorpha (Hemiptera) from India. *Rec. zool. Surv. India*, 100(1-2) : 55-97.
- THIRUMALAI, G. 2003. A checklist of aquatic and semi-aquatic Hemiptera (insecta) of Karnataka. *Rec. zool. Surv. India*, 102(1-2) : 55-70.
- THIRUMALAI, G. and S. KRISHNAN. 2000. Diversity of Gerromorpha (Heteroptera : Hemiptera : Insecta) in the Western Ghats States of India. *Rec. zool. Surv. India*, 98(4) : 59-77.
- ZETTEL, H. and G. THIRUMALAI. 2001a. *Stridulobates anderseni*, a new genus and species of ptilomerine Gerridae (Hemiptera : Heteroptera) with stridulatory devices from South India. *Insect Syst. Evol.*, 31(4) : 433-439.
- ZETTEL, H. and G. THIRUMALAI. 2001b. Re-establishment of ptilomerine genus *Jucundus* Distant, 1910 (Insecta : Heteroptera : Gerridae) with redescription of the type species *Jucundus custodiendus* Distant, 1919 from south India and notes on *J. vittatus* (Esaki, 1928) comb. n. from Sri Lanka. *Ann. Naturhist. Mus. Wien*, 103B : 273-282.

INSECTA : COLEOPTERA

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INTRODUCTION

The present study is based on the material collected by different parties of Southern Regional Station of Zoological Survey of India from Biligiri Rangasamy Temple Wildlife Sanctuary, Tamilnadu, collected particularly from shrubs, foliage, small trees, flowers and water bodies which include 7 species under 6 genera belonging to four families viz., Gyrinidae, Dytiscidae, Coccinellidae and Curculionidae. All the species are recorded here for the first time from this Wildlife Sanctuary.

SYSTEMATIC ACCOUNT : LIST OF TAXA

Family I GYRINIDAE

Subfamily (A) ENHYDRINAE

Genus 1. *Dineutus* Macleay, 1825

Subgenus *Dineutus (Protodineutus)* Och.

1. *Dineutus (Protodineutus) indicus* Aube

Family II DYTISCIDAE

Subfamily (B) DYTISCINAE

Genus 2. *Hydaticus* Leach, 1817

Subgenus *Hydaticus (Guignotites)* Brinck

2. *Hydaticus (Guignotites) fabricii* Macleay

3. *Hydaticus (Guignotites) vittatus* (Fab.)

Family III COCCINELLIDAE

Subfamily (C) COCCINELLINAE

Tribe Coccinellini

Genus 3. *Menochilus* Timberlake, 1943

4. *Menochilus sexmaculatus* (Fab.)

Genus 4. *Coccinella* Linnaeus, 1758

5. *Coccinella transversalis* Fab.

Subfamily (D) CHILOCORINAE

Tribe Chilocorini

Genus 5. *Brumus* Mulsant, 1850

6. *Brumus suturalis* (Fab.)

Family IV CURCULIONIDAE

Subfamily (E) OTIORRHYNCHINAE

Group PHYLLOBIIDES

Genus 6. *Myllocerus* Schönh., 1826

4. *Myllocerus discolor* Boh

SYSTEMATIC ACCOUNT

Family GYRINIDAE

The family Gyrinidae belongs to the suborder Adephaga of order Coleoptera and the members of this family are commonly known as 'whirligig beetles'. They are usually found in freshwater ponds, lake margins, open flowing streams, quiet stream margins, bogs, pools, swamps and ditches. They are predominantly scavengers and feeding on live or dead insects. Fabricius (1781) described the first species *viz.*, *Gyrinus spinosus* (since placed under *Dineutus*) from India, Coromandel coast. So far 55 species belonging to this family are recorded from India of which 17 species are recorded from Tamilnadu. Particularly the genus *Dineutus* Macleay belonging to the subfamily Enhydrinae includes 5 species from India. Present study reports the species *Dineutus (Protodineutus) indicus* Aube for the first time from Biligiri Rangaswamy Templewildlife Sanctuary.

1. *Dineutus (Protodineutus) indicus* Aube

Length : 12-15 mm.

Diagnostic characters : Black with clypeus and lateral margins showing bronze and green iridescence. Reticulation on head distinct, double and micro reticulations within larger, irregular and indistinct posteriorly; front angle of pronotum projecting and hind angle slightly curved, disc strongly reticulated on sides. Elytra feebly striate, puncturation double, external apical angle obtuse and rounded, internal apical angle straight. Femora in male with a tooth on the internal border before apex.

Material examined : 4 ex., Biligiri Rangaswamy Temple Hills, 29. ii. 2000, G. Thirumalai.

Distribution : India : West Bengal, Bihar, Orissa, Punjab, Kashmir, Himachal Pradesh, Gujarat, Central Province, Madhya Pradesh, Maharashtra, Karnataka, Tamilnadu, Kerala, Pondicherry.

Elsewhere : Pakistan.

Family DYTISCIDAE

Of the five aquatic families of Coleoptera belonging to the suborder Adephaga, the family Dytiscidae forms the main constituent of aquatic insect fauna. They are found both in fresh and brackish water. Larvae and adults of this group are carnivorous and prey on various aquatic animals like molluscs, worms, insects, tadpoles and small fishes. So far, 223 species under this family have been recorded from India. Present study records two species, viz., *fabricii* Macleay and *vittatus* (Fab.) under the genus *Hydaticus* Leach from Bilgiri Rangasamy Temple Wildlife Sanctuary.

Genus *Hydaticus* Leach, 1817

1817. *Hydaticus* Leach, Zool. Miscell., 3 : 69, 72

1977. *Hydaticus*, Vazirani, cat. orient, Dytiscidae, : 75

Key to the species of the genus *Hydaticus* Leach

Elytra reddish yellow and densely speckled with black irrotations, more or less condensed near the suture, sometimes appearing like black patches
..... *fabricii* Macleay]

Elytra black; two humeral and sub marginal yellow stripes on elyra converging posteriorly and joined after middle *vittatus* (F.)

2. *Hydaticus (Guignotites) fabricii* Macleay

1833. *Hydaticus fabricii* Macleay, Annulosa Javanica, Paris, : 134.

1838. *Hydaticus rufulus* Aube, In: Dejean's Species Coléopterès, Paris, 6 : 199.

1954. *Hydaticus (Guignotites) fabricii*, Guignot, Ark. Zool. (N. S.), 6 : 567.

1977. *Hydaticus (Guignotites) fabricii*, Vazirani, Rec. zool. Surv. India, Occ. Paper No. 6 : 76-77.

1995. *Hydaticus (Guignotites) fabricii*, Biswas, Mukhopadhyay and Saha, Zool. Surv. India, Fauna of West Bengal, State Fauna Series, 3(Part 6(A)) : 105-106.

Length : 8.75-10.75 mm.

Diagnostic characters : Head brown with a transverse black band on the posterior border

of vertex. Pronotum similarly with a transverse median black band along the posterior corner. Elytra densely speckled with black irrotations more or less condensed near the suture, sometimes giving the appearance of black patches. Fore tarsi with the basal three segments dilated, broad and oval, fringed with short hairs and the basal 'sucker palettes' little larger than others in male.

Material examined : 1 ex., Budipuduga, 28. ii. 2000, G. Thirumalai.

Distribution : India : West Bengal, Bihar, Assam, Orissa, Manipur, Sikkim, Punjab, Himachal Pradesh, Maharashtra, Rajasthan, Tamilnadu.

Elsewhere : Nepal, Myanmar, Pakistan, Indonesia, Philippines, and Vietnam.

3. *Hydaticus (Guignotites) vittatus* (Fab.)

- 1775. *Hydaticus vittatus* Fab. *Syst. Ent. Appendix, Flensburgi and Lipsiae*, : 825.
- 1838. *Hydaticus vittatus*, Aube. In : *Dejean's Species Coléoptères, Paris*, 6 : 208.
- 1977. *Hydaticus (Guignotites) fabricii*, Vazirani, *Rec. zool. Surv. India, Occ. Paper No. 6* : 81-82.
- 1995. *Hydaticus (Guignotites) fabricii*, Mukhopadhyay, Ghosh, Saha & Biswas, *Zool. Surv. India, Fauna of Meghalaya, State Fauna Series, 4(Part-5)* : 88.

Length : 12-14 mm.

Diagnostic characters : Species black, Form moderately elongate, oval, convex, pronotum smooth in male but with lateral striations in female. Humeral and submarginal portion of elytra with narrow yellow stripes joining together posteriorly after the middle. Male fore tarsi with the basal segments largely dilated and provided with larger basal sucker pallettes.

Material examined : 5 exs., Biligiri Rangaswamy Temple Hills, 29.ii.2000, G. Thirumalai; 8 exs., Biligiri Rangaswamy Templewildlife Sanctuary: Doddasampige, 2.iii.2000, G. Thirumalai.

Distribution : India : Bihar, Assam, Meghalaya, Orissa, Kashmir, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Uttaranchal, Andhra Pradesh, Tamilnadu.

Elsewhere : Nepal, Myanmar, Siam and Sri Lanka.

Family COCCINELLIDAE

The members of the family Coccinellidae are commonly known as 'Lady Bird Beetles' and usually draw attention to collectors because of their beautiful colours and are of great economic importance. Some are phytophagous but majority of them are carnivorous and play an important role in biological control of many harmful insects like aphids, coccids, aleurodids, plant mites and other soft-bodied insects. So far about 4500 species under 500 genera belonging to 21 tribes are known from the world, of which about 350 species

under more than 50 genera are recorded from India. Present study recorded 3 species viz. *Menochilus sexmaculatus* (Fab.), *Coccinella transversalis* Fab. and *Brumus suturalis* (Fab.) for the first time from Biligiri Rangasamy Wildlife Sanctuary.

4. *Menochilus sexmaculatus* (Fab.)

- 1781. *Coccinella sexmaculatus* Fab. *Spec. Ins.*, : 96.
- 1850. *Chilomenes sexmaculatus*, Mulsant, *Spec. Trim. Securipalp.*, : 144
- 1943. *Menochilus sexmaculatus* (Fab.) Timberlake, *Bull. Hawaiian Sug. Plrs. Ass. Exp. Stn. (Ent. Series)*, 47(22) : 40-41.

Length : 5.0 mm.

Diagnostic characters : Body testaceous yellow to yellowish brown, pronotum with a black band at base and a transverse oval black discal spot connected to the basal black band with a narrow constriction appearing like a 'T'; suture narrowly marginated black which is dilated behind scutellum and again before apex; each elytron with two wavy black bands (one median, one post humeral) and a round black, subapical spot, the bands are generally free, not connected with sutural margin. Each tarsal claw with a basal tooth.

Material examined : 1 ex., Girialla, 22. ii. 1999, S. Krishnan, 3 exs., Chenthankudi, 8. ii. 2000, S. Krishnan.

Distribution : India : West Bengal, Meghalaya, Tripura, Tamilnadu, Andaman Islands,

Elsewhere : Nepal, Indonesia, Philippines, Celebes, New Guinea, Japan, Thailand.

5. *Coccinella transversalis* Fab.

- 1781. *Coccinella transversalis* Fab. *Spec. Ins.*, : 97.
- 1966. *Coccinella transversalis*, Kapur, *Proc. nat. his. Sci. India*, 32 : 8(3-4) : 178.
- 1980. *Coccinella transversalis*, Chunram & Sasaji, *Oriental Ins.*, 14(4) : 485.

Length : 4.9 mm.

Diagnostic characters : Body oval, elytra testaceous yellow, each elytraon with a triangular black marking on the subhumeral area, with a wavy black, post median band confluent with the black sutural margin, a sub quadrate black spot at 3/4th the external margin, further two common spots, one immediately behind the scutellum and another before apex, present on the suture.

Material examined : 1 ex., Chenthankodi, 8.ii.2000, S. Krishnan; 2 exs., Biligiri Rangaswamy Temple Hills, 1.iii.1999, S. Krishnan.

Distribution : India : West Bengal, Meghalaya, Tripura, Tamilnadu, Keral, Goa, Andaman Islands.

Elsewhere : South east Asia, Japan, Australia, Thailand.

6. *Brumus suturalis* (Fab.)

- 1798. *Coccinella suturalis* Fab. *Suppl. Ent. Syst.*, : 78.
- 1850. *Brumus suturalis* (Fab.) : Mulsant, *Ann. Soc. Agric. Lyon*, 2(2) : 494.
- 1972. *Brumus suturalis*, Kapur, *Rec. zool. Surv. India*, 66(1-4) : 315.

Length : 3.0 mm.

Diagnostic characters : Body oval, moderately convex, pronotum reddish brown, elytra testaceous. Each elytron with a narrow black longitudinal stripe at middle and a black sutural border forming 3 black narrow stripes which are free at both ends.

Material examined : 1 ex., Kadakindgandi, 2.ii.2000, S. Krishnan.

Distribution : India : West Bengal, Meghalaya, Sikkim, Madhya Pradesh, Maharashtra, Karnataka, Tamilnadu, Goa.

Elsewhere : Nepal, Bhutan, Sri Lanka.

Family CURCULIONIDAE

The members of this family are commonly known as 'weevils' This family includes 50,000 of the 72 subfamilies from all over the world, 36 subfamilies are recorded from India. Majority of the species feed on rotten wood and cambium of roots, stems, flower, seeds, etc. This group is economically important because they are defoliators, leaf miners, stem, and woodborers, etc. Present study includes only one species under the genus *Myllocerus* Schönh. belonging to the subfamily Otiorrhynchinae. Marshall (1916) in Fauna of India recorded 72 species under this genus. Present study records one species *viz.*, *Myllocerus discolor* Boli from this Wildlife Sanctuary.

7. *Myllocerus discolor* Boh.

- 1834. *Myllocerus discolor* Boh., Schönh. *Gen. Curc.*, 2 : 428
- 1916. *Myllocerus discolor*, Marshall, *Fauna of British India including Ceylon and Burma, Col. Rhynchophora* : Curculionidae, : 348-349.

Length : 6.0 mm.

Diagnostic characters : Colour black with dull fawn-coloured scaling and pale markings. Rostrum very slightly widened at apex, eyes not naturally dorsal. Basal margin of prothorax distinctly bisinuate. Elytra with broad, coarsely punctate striae, setae little longer and conspicuous on disc, tooth of the hind femora bidentate.

Material examined : 1 ex., Chenthankodi, 25. ii. 2000, S. Krishnan.

Distribution : India : West Bengal, Bihar, Orissa, Punjab, Uttar Pradesh, Uttaranchal, Maharashtra, Tamilnadu.

Elsewhere : Bangladesh, Myanmar, Sri Lanka.

SUMMARY

The paper deals with 7 species under 6 genera belonging to four families viz., Gyrinidae, Dytiscidae, Coccinellidae and Curculionidae, of which three species viz., *Menochilus sexmaculatus* (Fab.), *Coccinella transversalis* Fab. and *Brumus suturalis* Fab. belong to the family Coccinellidae. All other species are recorded here for the first time from this Sanctuary.

REFERENCES

- AUBE, C. 1838. Species general des Hydrocanthares et Gyrininiens. In : *Species Coléoptères de la collection de M. Leconte Dejean*, 6 : I-xvi+804, Paris.
- BISWAS, S., MUKHOPADHYAY, P. and SAHA, S. K. 1995. *Insecta : Coleoptera : Adephaga : Family Gyrinidae and Family Halaplidae*. *Zool. Surv. India, Fauna of West Bengal, State Fauna Series*, 3(Part-6A) : 121-141.
- CHUNRAM, S. and SASAJI, H. 1980. A contribution to the Coccinellidae (Coleoptera) of Thailand. *Oriental Insects*, 14(4) : 473-491.
- CROTCH, G. R. 1874. A revision of the Coleopterous family Coccinellidae, London, : 1-311.
- FABRICIUS, J. C. 1781. *Species Insectorum*, 1 : viii+552.
- GYLLENHAL, L. 1843. In Schoenherr, Genera et species Curculionidum., 7(2) : 1-461.
- KAMIYA, H. 1965. A revision of the tribe Coccinellini of Japan and Ryukus (Col : Coccinellidae). *Mem. Fac. Lib. Arts., Fukui Univ., Ser. II, Nat. Sci. No.*, 15(Part-3) : 27-71, plt. I-III.
- KAPUR, A. P. 1958. The Coccinellidae of Nepal. *Rec. Ind. Mus.*, Delhi, 52(3& 4) : 309-338.
- KAPUR, A. P. 1966. The Coccinellidae (Coleoptera) of the Andamans. *Proc. nat. Inst. Sci. India*, Delhi, 32(3-4) : 148-189.
- KORSCHESKY, R. 1931-32. Coccinellidae. *Coleopterorum catalogus*. W. Junk editors A. S. Schenkling, Paris, 118, 120 : 659.
- MACLEAY, W. S., 1825. *Annulosa Javanica*, ed. 1 : I-xii+50.
- MARSHALL, G. A. K. 1916. *The fauna of British India including Ceylon and Burma, Coleoptera : Rhynchophora : Curculionidae*, Taylor and Francis, London, : V + Xi-367.

- MUKHOPADHYAY, P., GHOSH, S. K. SAHA, S. K. and BISWAS, S. 2000. Insecta : Coleoptera : Family : Gyrinidae, Dytiscidae and Hydrophilidae. *Zool. Surv. India, Fauna of Meghalaya, State Fauna Series, 4(Part-5)* : 77-92.
- MULSANT, M. E. 1850. Species de Coleopteres trimeres securipalpes. *Ann. Soc. Agric. Lyon, 2(2)* : 1-1104.
- OCHS, G. 1925. Description of new asiatic Gyrinidae. *Rec. Ind. Mus., 27* : 193-204.
- SHARP, D. 1891. Haliplidae, Dytiscidae, Gyrinidae, Hydrophilidae in Scientific Results 2nd Yark and Mission, Coleoptera : 37-53.
- VAZIRANI, T. G. 1977. Catalogue of Oriental Dytiscidae. *Rec. zool Surv. India, Occ. Paper No., 6* : 1-111.
- VAZIRANI, T. G. 1984. Fauna of India. Coleoptera. Family Gyrinidae and Family Haliplidae, : V-Xi+140pp, pls. I-III, Fig. 1-57.

INSECTA : COLEOPTERA : SCARABAEOIDEA : SCARABAEIDAE (Dung Beetles)

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INTRODUCTION

Dung beetles (Scarabaeidae, Scarabaeoidea : Coleoptera), is a widely distributed group of beetles, with a cosmopolitan distribution, adapted to most habitats, and play an important role in ecosystem functions. There are about 5000 species of dung beetles reported from all over. Dung beetles generally grouped into dwellers, which live and nest within a dung pat, burrowers, which dig nests under dung pats, and rollers (Hanski & Cambefort 1991; Halffter & Edmonds 1982; Halffter & Matthews 1966). The extensive collections of dung beetles made by the author during the period 1997-2001, has been studied.

SYSTEMATIC ACCOUNT

Order COLEOPTERA

Superfamily SCARABAEOIDEA

Family SCARABAEIDAE

Key to the genera of family SCARABAEIDAE

1. Pronotum with two basal impressions near the middle *Onitis*
- Pronotum without two basal impressions near the middle 2
2. Scutellum present 3
- Scutellum absent 5
3. Elytra not fringed before the hind margin *Liatongus*
- Elytra fringed before the hind margin 4

- 4. Sides of the abdomen exposed above *Oniticellus*
- Sides of the abdomen not exposed above *Drepanocerous*
- 5. Middle and hind tibia slender and not dilated at the end *Phacosoma*
- Middle and hind tibia dilated at the end 6
- 6. Elytra with two lateral carinae 7
- Elytra with one lateral carina 8
- 7. Very large, First joint of the antennal club shining *Heliocorpirs*
Not very large, Antennal club entirely pubescent *Catharsius*
- 8. Pronotum with a strong basal groove *Copris*
- Pronotum without a strong basal groove 9
- 9. Four posterior tarsi broadly dilated *Phalops*
- Four posterior tarsi broadly dilated 10
- 10. Terminal margin of the front, tibia at right angles to the inner margin and anterior angles of the prothorax hollowed beneath *Caccobius*
- These characters not both and usually neither present *Onthophagus*

Subfamily SCARABAEINAE

Diagnosis : Body rather depressed, black, yellowish brown or metallically colored. Legs very slender. The mid and hind tibia narrow and not dilated at the end; tarsi filiform. with little developed. Sexes not conspicuously differ. Mostly dung rollers.

Tribe Scarabaeini

Genus *Scarabaeus* L.

Scarabaeus Linné, 1758, *Syst. nat. ed. X* : 345; 1767. Ed. XII : 541; Fabricius, 1775, *Syst. Ent.* : 3; v. Lansberg, 1874 : 182; Bedel, 1892: 281; Reitter, 1892 (1893) : 37, 40; Péringuey, 1990 (1901) : 23; Arrow, 1931 : 38; Portevin, 1931 : 40; Porta, 1932 : 406; Balthasar, 1935 : 28; 1963, Band 1 : 144; Stolfa, 1938 : 141; Janssens, 1940 : 14; Janssens, 1941, 1; Paulian, 1941 : 50; F., *Syst. Ent.* 1775, p. 3.

Actinophorus Creutzer, 1799, *Ent. Versuche*; 79.

Ateuchus Weber, 1801, *Observ. Ent.* : 10; Fabricius 1801, *Syst. Eleuth.* I, : 54; Lacordaire, 1856, *Gen. coll.* III : 66; Shipp, 1894, *Entomologist* 27 : 254, 289, 309; 1895, l.c.: 218; *Heliocantharus* Mac Leay, 1821, *Horae Ent.* I(2) : 497; 1833, *Annul. Javan. Reimpr.* : 49;

Sebasteos Westwood, 1847, *Trans. Ent. Soc. Lond.* IV : 226; Péringuey, 1900 (1901) : 57; Janssens, 1940 : 5; Kolbe, 1895, *Stett. Ent. Ztg.* 56 : 333;

Ateuchetus Bedel, 1892 : 282-283; Reitter, 1892 (1893) : 41.

Parateuchus Shipp, 1895, *Entomologist*, 28 : 21;

Subgen. *Kheper* Janssens, 1940 : 14, 59; Balthasar, 1940 : 67ff.; Janssens, 941 : 7.

This genus of rollers can be easily recognized by the absence of front tarsi and elytra excised behind the shoulders.

Type : *Scrabaeus sacer* L.

Range : S. Europe, Asia, Africa.

1. *Scarabaeus (Kheper) erichsoni* (Har.)

Ateuchus erichsoni Harold, 1867, *Col. Hefte*. II : 94.

Scarabaeus erichsoni Arrow, 1931 : 45.

Scarabaeus (Kheper) erichsoni Balthasar, 1963, Band, 1 : 173.

Diagnosis : Scutellum visible; front tibia with the uppermost external tooth very small; pronotum, broad, flat and without smoother basal area.

Size : Length 21-26 mm, Breadth 12-15 mm.

• *Material examined* : 3 exs. (Budipadaga, scrub).

Distribution : S. India.

Elsewhere : Sri Lanka.

Tribe *Gymnopleurini*

Genus *Gymnopleurus* Illig.

Gymnopleurus Illiger 1803; *Mag. Ins.* II : 199 : Latreille, 1807, *Gen. Crust. et. Ins.* II : 78; Lacordaire., 1856, *Gen. Co.* III, 72, 73; Reitter, 1892 : 37, 42; Shipp, 1897, *Entomologist* XXX : 62, 166; Kolbe, 1897, *Käfer Deutsch-Ost Afr.* : 135; Péringuey, 1900/01 : 22, 64; Garreta, 1914 : 51, 55; Boucomont et Gillet, 1921 : 3; Arrow, 1931 : 46; Portevin, 1931 : 40; Porta, 1932 : 407; Balthasar, 1935 : 38; 1963, Band 1 : 177; Janssens, 1938 : 30; 1940a : 40 (ex parte); Paulian, 1941 : 53; *Spinigymnopleurus* Shipp, l.c. : 166.

Subgen. *Paragymnopleurus* Garreta, 1914, 52.

Subgen. *Garreta* Janssens, 1940a : 15, 33.

Diagnosis : The genus could be easily recognized by the elytra, which is excised behind the shoulders.

Type : *Ateuchus flagellatus* F.

Range : E. Europe, Africa, Asia.

Key to the species of *Gymnopleurus*

1. Sides of the abdomen not carinate at the base 2
- Sides of the abdomen sharply carinate at the base 4
2. Clypeus quadridentate 3
- Clypeus bidentate *G. parvus* MacL.
3. Upper surface without hairy clothing *G. cyaneus* F.
- Upper surface clothed with fine hairs *G. miliaris* F.
4. Upper surface clothed with fine hairs *G. spilotus* MacL.
- Upper surface without hairy clothing 5
5. Upper surface not shining *G. dejearni* Cast.
- Upper surface very shining *G. sumptuosus* Cast.

2. *Gymnopleurus* (s. str.) *cyaneus* (F.)

Copris cyaneus Fabricius, 1798, *Ent. Syst., Suppl.*, : 34; Mac Leay, 1821, *Hor. Ent.* I, 2 : 515; 1833, *Ann. Javan. Rimpr.*, : 62; *Gymnopleurus cyaneus* Arrow, 1931 : 49., Tf. 3, Fig. 6; Janssens, 1940a : 53, 66, Tf. 3, Fig. 9; Balthasar, 1963, Band 1 : 207; *Gymnopleurus* (s. str.) *cyaneus* Balthasar, 1963, Band, 1 : 207.

Gymnopleurus indicus Castelnau, 1840, *Hist. Nat.*, II : 73.

Gymnopleurus impressus Castelnau, 1840 : 73.

Diagnosis : Sides of the abdomen not carinate at the base; clypeus quadridentate; upper surface without hairy clothing.

Size : Length, 8-12 mm breadth, 5-8 mm.

Material examined : 3exs., (Purani, DD).

Distribution : India.

Elsewhere : Sri Lanka.

3. *Gymnopleurus* (s. str.) *miliaris* (F.)

Scarabaeus miliaris Fabricius, 1775, *Syst. Ent. App.*, : 817; 1787 : 17; Olivier, 1784, *Ent. I. Scarab.*, : 167, Tf. 18, Fig. 164; Mac Leay, 1821, *Horae Ent.* I, 2 : 517; 1833, *Ann. Javan. Reimpr.*, : 36; Castelnau, 1840 : 72; *Gymnopleurus miliaris* Arrow, 1931 : 50, Tf. 3, Fig. 3; *Gymnopleurus* (s. str.) *miliaris* Balthasar, 1935 : 52; 1963, Band 1 : 207-208; Janssens, 1940a : 53, 66, Tf. 2, Fig. 12.

Diagnosis : Sides of the abdomen not carinate at the base; clypeus quadridentate; upper surface clothed with fine hairs.

Size : 7.5-11.5 mm x 5-8 mm.

Material examined : 1 ex. (Purani, DD), 19.5.99.

Distribution : Greater parts of India.

Elsewhere : Sri Lanka, East Afghanistan,

4. *Gymnopleurus (s. str.) parvus* (Mac Leay)

Scarabaeus parvus Mac Leay, 1821, *Horae Ent.*, : 517. *Gymnopleurus parvus* Arrow, 1931 : 52;
Gymnopleurus (s. str.) parvus Balthasar, 1963, Band, 1 : 202-203.

Diagnosis : Sides of the abdomen not carinate at the base; clypeus bidentate; upper surface clothed with fine hairs; pronotum with about six shining spots.

Size : 7-8 mm x 5-6 mm.

Material examined : 3 exs. (Budipadaga, S).

Distribution : India.

Elsewhere : Sri Lanka.

5. *Gymnopleurus (Garreta) dejeani* Cast

Gymnopleurus dejani Castelnau, 1840, *Hist. Nat.*, II : 70; Arrow, 1931, Fauna Brit. India, (Coleoptera : Lamellicornia) : 59; Janssens, 1940a : 26, 31; *Gymnopleurus (Garreta) dejani* Balthasar, 1963, Band, 1 : 227-228.

Gymnopleurus inconspicuus Waterhouse, 1890, *Ann. Nat. Hist.*, (6)V : 371.

Diagnosis : Sides of the abdomen sharply carinate at base; Clypeus quadridentate; upper surface without hairy clothing, not shining, without punctures; pronotum with two minute basal impressions.

Size : 14.5-20 mm x 10-12.5 mm.

Material examined : 18 exs. (Purani, DD).

Distribution : Greater parts of India.

6. *Gymnopleurus (Garreta) sumptuosus* Cast.

Gymnopleurus sumptuosus Castelnau, 1840, *Hist. Nat.*, II, : 71; Arrow, 1931 : 62; Janssens, 1940a : 27, 33; *Gymnopleurus (Garreta) sumptuosus* Balthasar, 1963, Band, 1 : 229-230.

Gymnopleurus splendens Castelnau 1840, (id. 1 c.), : 71.

Diagnosis : Sides of abdomen sharply carinate at the base; clypeus quadridentate; upper surface without hairy clothing, very shining; pronotum strongly punctured.

Size : 13.5-20 mm × 9-13 mm.

Material examined : 1 ex. (Purani, DD).

Distribution : Central and S. India.

7. *Gymnopleurus (Allogymnopleurus) spilotus* (MacLeay)

Scarabaeus spilotus Mac Leay, 1821. *Horae Entom.*, I : 517; *Gymnopleurus spilotus* Arrow, 1931 : 55-56; *Gymnopleurus (Allogymnopleurus) spilotus* Balthasar, 1963, Band, 1 : 231-232.

Diagnosis : Sides of abdomen sharply carinate at the base; clypeus quadridentate; upper surface clothed with fine hairs; elytra with longitudinal and transverse shining patches.

Size : 11-14 mm × 7-9 mm.

Material examined : 3 exs. (Budipadaga, scrub).

Distribution : S. & E. India.

Tribe Sisyphini

Genus *Sisyphus* Latr.

Sisyphus Latreille, 1807, *Gen. Crust. et Ins.*, II, : 79; Gory, 1833, *Monogr. Du genre Sisyphe*, : 1-15; Lacordaire, 1856, *Gen. Col.* III, : 72; Reitter, 1892 (1893) : 158, 164; Pèringuey, 1900 (1901) : 22, 94-103, 897, 898; Arrow, 1927a, *Ann. Mag. Nat. Hist.*, (9) IX : 456-465; Balthasar, 1935 : 52; 1963, Band 1 : 233; Haaf, 1955 : 341.

subgen. *Neosisyphus* Muller, 1942, *Atti Mus. Stor. Nat. Trieste*, XV : 86; Haaf, 1995 : 346.

Diagnosis : This genus could be easily distinguished with exceedingly long and slender legs and short and globose body shape.

Type : *Scarabaeus schaefferi* L.

Range : Europe, Africa, Mauritius, India, China, Malay Archipelago, Central America

Key to the species of *Sisyphus*

1. Hind femur short stalked *S. crispatus hirtus* Wied.
– Basal half of the hind femur forming a slender footstalk 2
2. Hindfemur gradually dilated *S. longipes* (Oliv.)
– Hind femur abruptly dilated *S. neglectus* Gory

8. *Sisyphus* (*s. str.*) *crispatus hirtus* Wied.

Sisyphus hirtus Wiederman, 1823 *Zool. Mag.* ii, I. : 24; Arrow, 1927a : 458; 1931: 76; Haaf, 1955 : 348.

Sisyphus setulosus Walker 1858, *Ann. Nat. Hist.* (3) ii : 208. Var, *subsidens* Walker, 1858, *Ann. Mag. Nat. Hist.*, (3)II : 208;

Sisyphus prominens Walker, 1859, *Ann. Mag. Nat. Hist.*, (3)IV : 219

Diagnosis : Pronotum not closely punctured, without a median raised line; hind femur short and stalked.

Size : 6-9.5 mm × 4-6 mm.

Material examined : 126 exs. (Budipadaga, Scrub); 5 exs. (Kanneri, Moist deciduous); 1 ex. (Purani, Scrub).

Distribution : India.

Elsewhere : Sri Lanka.

9. *Sisyphus* (*s. str.*) *longipes* (Oliv.)

Scarabaeus longipes Olivier, 1789, *Entom.* I, 3 : 164, pl. xix fig. 177; Arrow, 1927a, *Ann. Mag. Nat. Hist.*, (9) XIX : 457; 1931 : 71; Haaf, 1955 : 345, 355; Balthasar, 1963, Band, 1 : 239.

Scarabaeus minutus Fabricius, 1792, *Ent. Syst.* I, : 70; Gory, 1833, *Monogr.*, : 15.

Copris helwigi Fabricius, 1798, **Ent. Syst. Suppl.*, : 35.

Diagnosis : Middle femur and tibiae not toothed; hind femur gradually dilated forming a slender footstalk.

Size : 4-6.5 mm × 2.5-4 mm.

Material examined : 177 exs., (Budipadaga, S); 711 exs., (Purani, DD).]

Distribution : India.

Elsewhere : Myanmar, Sri Lanka.

10. *Sisyphus* (*s. str.*) *neglectus* Gory

Sisyphus neglectus Gory, 1833, *Monographie Sisyphus*, : 14; Arrow, 1927, *Ann. Mus. Nat.*, (9) : xix, 460; 1931 : 73; Haaf, 1955 : 348, 353; *Sisyphus* (*s. str.*) *neglectus* Balthasar, 1935 : 54; 1963, Band, 1 : 242.

Sisyphus denticrus Fairemaire, 1886, *Ann. Soc. Ent. Fr.*, (6)VII : 320.

Sisyphus laoticus Arrow, 1927, *Ann. Mag. Nat. Hist.*, (9)XIX : 463.

Diagnosis : Hind femur abruptly dilated; pronotum with very shallow punctures.

Size : 5.5-7 mm × 3.5-4 mm.

Material examined : 88 exs., (Budipadaga, S); 4 exs., (Purani, DD).

Distribution : Greater parts of India.

Diagnosis : The legs are not very slender; the middle coxae are far apart and more or less parallel. The middle and hind tibiae dilate towards the extremity.

Subfamily COPRINAE

Tribe Coprini

Genus *Heliocoris* Hope

Heliocoris Hope, 1837, *Coleopt. Manual*, I : 23; Burmeister, 1846, *Gen. Inst. Heft*, 10, Col. no. 27, figs. 1-8; Reitter, 1892 (1893) : 92; Lacordaire, 1856, *Gen. Col.* iii, : 98; Peringuey, 1900 (1901) : 109, 310; Arrow, 1931 : 84; Balthasar, 1935 : 58; Janddens, 1938 : 47; Paulian, 1945 : 66; 1963, Balthasar, 1963, Band 1 : 297.

Large, broad and massive insects; elytra with broad epipluera bearing a supplementary carina and seven dorsal striae. One of the chief distinctive characters of this genus is stridulating ridges found within the hind coxal cavities.

Type : *Copris pirmal* F. (South Africa).

Range : Africa, Arabia, India, Malay Peninsula, Sumatra.

Key to the species of *Heliocoris*

- 1 Clypeus not distinctly truncate in front, rounded at the sides ♂ head bearing a single horn *H. bucephalus* F.
- Clypeus truncate in front, angulate at the sides; ♂ head bearing two or four horns *H. dominus* Bates

11. *Heliocoris bucephalus* (Fabr.)

Scarabaeus bucephalus Fabricius, 1775, *Syst. Ent.*, : 24; *Oliv. Ent.*, i. 3, 1789, : 99, pl. 4, fig. 26.; Castelnau, 1840 : 76; Arrow, 1931 : 88; Balthasar, 1931 : 61; 1963, Band, 1 : 303-304;

Heliocoris cristatus Degeer, 17789, *Mem. Ins.*, VII : 636.

Heliocoris tmolus Fischer, 182, *Entomogr. Russ.*, I : Tf. 13, Fg. 2è

Biologie : Ghosh, 1923 (1924) *Rept. Proc. 5th Meet. Pusa*, : 404.

Diagnosis : Clypeus not distinctly truncate in front, rounded at the sides; ?? with a single horn on the head.

Size : 39-55 mm × 24-30 mm.

Material examined : 1 ex., (Budipadaga, S); 3 exs., (Purani, DD)

Distribution : Myanmar, Malay Peninsula, Siam, East and Peninsular India.

12. *Heliocoprism dominus* Bates

Heliocoprism domina Bates, 1868, Col. Hefte, vol. IV. : 88; *Heliocoprism dominus*, Arrow, 1931 : 90. Janssens, 1939 : 81, 98; Paulin, 1945 : 67; Balthasar, 1963, Band, 1 : 302-303.

Heliocoprism mouhotus Sharp, 1878, Ent. Mon. Mag., XV : 155 : *Fasc. Malay. Zool.* i. 1903, : 285.

Diagnosis : Elytra shining, not closely sculptured; clypeus truncate in front, angulate at the sides; head two or four horned.

Size : 50-65 mm × 31-38 mm.

Material examined : 3 exs., (Budipadaga, S); 10 exs., (Kanneri, MD).

Distribution : India (Eastern Himalayas, Western Ghats).

Elsewhere : Myanmar, Siam, Malay Peninsula.

Remarks : This is a new report of this species from Western Ghat region.

Genus *Catharsius* Hope

Catharsius Hope, 1837, Col. Mon., I. : 21; Burmeister, 1846, Gen. Ins., X, col. no. 27; Erichs. Ins. Deutschl., iii, 1848 : 761; Peringuey, 1900 (1901) : 109, 323; Boucomont et Gillet, 1921 : 7; Arrow, 1931 : 92; Balthasar, 1935 : 62; 1963, Band, 1 : 304-305; Paulian, 1945 : 68.

Subgen. *Metacatharsius* Paulian (Gill. In Litt.), 1939, Rev. Fr. Ent., VI : 13.

Diagnosis : Broad, compact and very convex insects, could be distinguished from its nearest genera by an entirely pubescent antennal club and a sharp longitudinal carina replacing the eighth stria of the elytra.

Type : *Scarabaeus molossus* L.

Range : Africa and South Asia.

Key to the species of *Catharsius*

1. Elytra entirely opaque 2
- Elytra not entirely opaque 4
2. Head with a small smooth area adjoining each eye *C. molossus* (L)
- Head without a small smooth area adjoining each eye 3
3. Pronotum with lateral prominence on each side *C. granulatus* Sharp
- Pronotum without lateral prominence on each side *C. sagax* (Quens)

- 4 Head not very transverse; pronotum of ♂ with four tubercles *C. capucinus* (F.)
 - Head very transverse; pronotum of ♂ with two tubercles *C. pithecius* (F.)

13. *Catharsius (s. str.) molossus* (L)

Scarabaeus molossus Linnè, 1758, *Syst. Nat.*, ed. X, : 347; Harold, 1877 : 44; Boucomont et gillet, 1921 : 8; Arrow, 1931 : 94; *Catharsius (s. str.) molossus* Balthasar, 1935 : 65; Balthasar, 1963, Band, 1 : 307-308; Paulian, 1945 : 69.

Catharsius abbreviatus Herbst, 1789, *Käfer*, II : 53.

Catharsius berbiceus Herbst, l.c. : 227.

Catharsius janus Oliver, 1789, *Entom I, Scarab*, : 101.

Copris ursus F., *Syst. Eleuth.* i 1801 : 43.

Catharsius borneensis Paulin, 1936, *Treubia* 15 : 396 (*n. nud.*).

Catharsius dubius Paulin, l.c. (*n. Nud.*)

Catharsius dayacus Lansberge, 1886, *Tijdschr., entom.*, XXIX : 6.

Catharsius timorensis Lansberge, 1879, *Ann. Soc. Ent. Belg.*, XXII, C. r. : 148.

Catharsius kangeanus Paulin, l.c. : 395.

Diagnosis : Pronotum without distinct hind angles; head with a small smooth area adjoining each eye.

Size : 23-37 mm x 14-22 mm.

Material examined : 2 exs., (Budipadaga, S); 9 exs., (Kanneri, MD); 87 exs. Gombegallu (EG); 4 exs. (Honnametty, Shola).

Distribution : India : Andaman.

Elsewhere : Sri Lanka.

14. *Catharsius (s. str.) granulatus* Sharp

Catharsius granulatus Sharp, 1875, *Col. Hefte*, XIII : 41; *Lansb., Tijds. Ent.*, xxix, 1886 : 6, note; Arrow, 1931 : 95; *Catharsius (s. str.) granulatus* Balthasar, 1963, Band, 1 : 309.

Diagnosis : Pronotum without distinct hind angles but with lateral prominences on each side; head without smooth area adjoining eyes.

Size : 23-32 mm x 14-19 mm.

Material examined : 1ex (Budipadaga, S).

Distribution : North & North East India.

Elsewhere : Pakistan, Sri Lanka.

Remarks : New report from Western Ghats.

15. *Catharsius (s. str.) sagax* (Quens)

Copris sagax Quenstedt, 1806, *Schonh. Syn. Ins.*, I : 43; *Lansb., Tijds. Ent.*, xxix, 1886 : 6. Note; Boucomont et. Gillet, 1921 : 8; Arrow, 1931 : 96; *Catharsius (s. str.) sagax* Balthasar, 1935 : 65; Balthasar, 1963, Band, 1 : 309-310.

Diagnosis : Pronotum without distinct hind angles or lateral prominences; head without smooth area adjoining eyes; Elytra entirely opaque.

Size : 23-36 mm × 14-20 mm.

Material examined : 11 exs. (Budipadaga, S).

Distribution : India.

Elsewhere : Bhutan.

16. *Catharsius (s. str.) capucinus* (F.)

Scarabaeus capucinus Fabricius, 1781, *Spec. Ins.*, I : 25; *Oliv., Ent.*, I, 3, 1789 : 117, pl. 2, fig. 12; Boucomont et. Gillet, 1921 : 9; Arrow, 1931 : 99; *Catharsius (s. str.) capucinus* Balthasar, 1963, Band, 1 : 312.

Copris capusinus Castelnau, 1840 : 79.

Diagnosis : Elytra not entirely opaque; posterior tarsi not very broad; granules of pronotum less fine and dense; head not very transverse; pronotum of male with four tubercles.

Size : 18-26 mm × 11-15 mm.

Material examined : 24 exs., (Budipadaga, S); 1 ex., (Purani, DD).

Distribution : India.

Elsewhere : Sri Lanka.

17. *Catharsius (s. str.) pithecius* (F.)

Scarabaeus pithecius Fabricius, 1775, *Syst. Ent.*, : 21. Boucomont et. Gillet, 1921 : 9; Arrow, 1931 : 100; *Catharsius (s. str.) pithecius* Balthasar, 1935 : 64; Balthasar, 1963, Band, 1 : 312-313;

Scarabaeus sabaeus Fabricius, 1781, *Spec. Ins.*, I : 23.

Scarabaeus nanus Fabricius, 1792, *Ent. Syst.*, I : 42.

Copris pithecius Castelnau, 1840 : 78; Reitter, 1892(1893) : 94.

Copris sinensis Hope, 1842, *Proc. Ent. Soc. London*, : 66.

Copris cribripennis Walker, 1858, *Ann. Mag. Nat. Hist.*, (3)II : 208.

Diagnosis : Elytra not entirely opaque; posterior tarsi not very broad; granules of pronotum less fine and dense; head very transverse; pronotum of male with 2 horns.

Size : 15-23 mm × 10-13.5 mm.

Material examined : 22 exs., (Budipadaga, S).

Distribution : Greater part of India.

Elsewhere : Sri Lanka.

Genus *Copris*

Copris Geoffroy, 1762, *Ins. Env. De Paris*, I : 87; Burmeister, 1846, *Genera Ins. Heft*, 10, Col. No. 27; Reitter, 1892 (1893) : 39, 93; Péringuey, 1900 (1901) : 110, 342; Boucomont et gillet, 1921 : 10; Arrow, 1931 : 102; Balthasar, 1933 : 263; Balthasar, 1935 : 66; Janssens, 1939 : 40; Paulian, 1945 : 71; Balthasar, 1963, Band, 1 : 317.

subgen. *Litocopris* Waterhouse, 1891, *Ann. Mag. Nat. Hist.*, (6)VIII : 53.

subgen *Paracopris* Balthasar, 1939, *Redia* XXV : 2; Paulian, 1945 : 72.

subgen. *Microcopris* Balthasar, 1958, *Acta. Ent. M.N. Pragae*, 32 : 474.

Diagnosis : Compact and convex insects, generally black and without any hairy clothing above. This genus could easily distinguished by a deep groove around the basal margin of the pronotum.

Type : *Scarabaeus lunaris* L.

Range : Europe, Asia, Africa, Malay Archipelago.

Key to the species of *Copris*

1. Pronotum with sharply defined anterior declivity 2
- Pronotum without sharply defined anterior declivity 4
2. Front angles of the prothorax very blunt *C. fricator* (Fabr.)
- Front angles of the prothorax sharp 3
3. Elytra deeply striate *C. sodalis* Walk
- Elytra feebly striate *C. repertus* Walk
4. Elytral intervals not very closely punctured *C. andrewesi* Waterh
- Elytral intervals closely punctured 5

5. Metasternal shield unpunctured *C. signatus* Walk
 – Metasternal shield punctured in front *C. davisoni* Waterh

18. *Copris (s. str.) fricator* (Fabr.)

Scarbaeus fricator Fabricius, 1787, *Mant. Ins.*, I : 15; Fabricius, 1801, *Syst. Eleuth.*, I : 45; Olivier, 1789, *Entom. I. Scarab.*, : 122, Tf. 16, Fig. 149; *Copris (s. str.) fricator* Balthasar, 1963, Band, 1 : 340.

Copris indicus Gillet, 1910, *Notes Leyd. Mus.*, XXXII : 5; *Ann. Soc. Ent. Belg.* v, 1911 : 314; Arrow, 1931 : 106.

Diagnosis : Pronotum with sharply defined anterior declivity, front angles very blunt; elytra very shining.

Size : 12.5-15.5 mm x 7.5-9.5 mm.

Material examined : 11 exs. (Budipadaga, Scrub); 2 exs. (Purani, Scrub); 2 exs. (Kanneri, Moist deciduous).

Distribution : India.

Elsewhere : Sri Lanka.

19. *Copris (s. str.) repertus* Walk.

Copris repertus Walker, 1858, *Ann. Mag. Nat. Hist.*, (3) II : 208; *Lansb., Tijds. Ent.*, xxix, 1886, p. 11; Gillet, 1911 : 116; Balthasar, 1933: 272 Balthasar, 1935 : 78; *Copris (s. str.) repertus* Balthasar, 1963, Band, 1 : 351.

Copris claudius Harold, 1877, *Ann. Mus. Civ. Genova*, X : 48.

Diagnosis : Pronotum with sharply defined anterior declivity, scarcely punctured; sides of metasternum with scanty hairs; elytra feebly striate.

Size : 16-22 mm x 9-12 mm.

Material examined : 5 exs. (Budipadaga, Scrub); 51 exs. (Purani, DD); 6 exs. (Kanneri, Moist deciduous); 1 ex. (Honnemetty, Shola), 5 exs. (Gummane, Shola).

Distribution : India.

Elsewhere : Sri Lanka, Myanmar.

20. *Copris (s. str.) sodalis* Walk

Copris sodalis Walker, 1858, *Ann. Mag. Nat. Hist.*, (3) II : 208; Arrow, 1931 : 114; *Copris (s. str.) sodalis* Balthasar, 1963, Band, 1 : 347.

Copris taprobanus Gillet, 1910, *Notes Leyd. Mus.*, XXXII : 9.

Diagnosis : Pronotum with sharply defined anterior declivity, front angles very blunt; pygidium not strongly punctured; sides of metasternum with scanty hairs; elytra deeply striate; punctures of the striae not close together.

Size : 15 mm x 8.5 mm.

Material examined : 23 exs. (Budipadaga, Scrub); 29 exs. (Purani, Scrub); 14 exs. (Kanneri, Moist deciduous); 3exs (Gombekallu, EG), 4 exs. (Gummane, Shola).

Distribution : Sri Lanka.

Remarks : This species was supposed to be a rare endemic species to Sri Lanka (Balthasar, 1963). Now this species is reported from India.

21. *Copris (Paracopris) andrewesi* Waterh

Copris andrewesi Waterhouse, 1891, *Ann. Mag. Nat. Hist.*, (6) VII : 521; Arrow, 1931 : 127; *Copris (Paracopris) andrewesi* Balthasar, 1963, Band, 1 : 368.

Diagnosis : Pronotum rather densely punctured, without a sharply defined anterior declivity and without a median groove or a line and front margin not prominent in the middle.

Size : 11.5-15.5 mm x 6-7.5 mm.

Material examined : 1ex. (Honnametti, Shola).

Distribution : South and Central India.

22. *Copris (Paracopris) davisoni* Waterh

Copris davisoni Waterhouse, 1891, *Ann. Mag. Nat. Hist.*, (6) VII : 520; Arrow, 1931 : 132; Balthasar, 1963, Band, 1 : 373, Tf. XXIV, Fig.2)

Diagnosis : Pronotum without a sharply defined anterior declivity, a median groove or a line; elytral intervals closely punctured.

Size : 10-14 mm x 5.5-8 mm.

Material examined : 14 exs. (Budipadaga, Scrub); 55 exs. (Purani, Scrub); 22 exs. (Kanneri, Moist deciduous); 2exs (Gommekallu, EG), 61 exs. (Honnemetty, Shola), 4 exs. (Gummane, Shola).

Distribution : S. India.

23. *Copris (Paracopris) signatus* Walk

Copris signatus Walker, 1858, *Ann. Mag. Nat. Hist.*, (3)2 : 208; Wat., 1891, *op. cit.*, (6) VII : 520; Boucomont et. Gillet, 1921 : 12; Arrow, 1931 : 131; Paulian, 1945 : 74; *Copris (Paracopris) signatus*. Balthasar, 1963, Band, 1 : 371.

Diagnosis : Pronotum without a sharply defined anterior declivity, a median groove or a line; elytral intervals closely punctured; Metasternal shield not punctured.

Size : 10-15 mm × 6-8.5 mm.

Material examined : 45 exs. (Budipadaga, Scrub); 18 exs. (Purani, DD).

Distribution : South India (Kerala, Tamil Nadu, Karnataka, Maharashtra).

Elsewhere : Sri Lanka.

Tribe Oniticellini

Genus *Drepanocerus* Kirby

Drepanocerus Kirby, 1828, Zool. Journ., III : 521; Castelnau, 1840 : 92; Lacordaire, 1856, Gen. Col., II : 105, 111; Péringuay, 1900 (1901) : 108, 110; Boucomont et Gillet, 1921 : 19; Boucomont, 1921b : 200; Arrow, 1931 : 380; Balthasar, 1935 : 97; Paulian, 1945 : 50, 137; Janssens, 1953 : 9, 12. Balthasar, 1963, Band 1 : 61; *Ixodina* Roth, Arch. Nat., XVII, 1851, 1 : 128.

Cyptochirus Lesne, 1900, apud Ch. Michel, Vers Fachoda, : 499.

Drepanochirus Péringuay, 1900 (1901), Trans. S. Afr. Phil. Soc., XII : 17; Boucomont, 1921b : 199.

Diagnosis : Small, elongate and dorsally flattened insect with a distinctly visible scutellum; sides of the abdomen not exposed as in *Oniticellus*.

Type : *D. Kirbyi* Kirby (S. Africa).

Range : Africa, India, China, Java.

24. *Drepanocerus setosus* (Wied.)

Copris setosa Wiederman, 1823, Zool. Mag., II, L : 19; Arrow, 1931 : 381; Janssens, 1953 : 19, 31.

Ixodina setosa Motschulsky, 1863, Bull. Soc. Nat. Moscou., XXXVI, II : 459.

Diagnosis : Front angles of the pronotum distinct; head finely and not closely punctured; è with a single thoracic horn.

Size : 4.5-5.5 mm × 2.5 mm.

Material examined : 1195 exs. (Budipadaga, S); 1157 exs. (Purani, DD); 4151 exs. (Kanneri, MD); 244 exs. Gombegallu (EG); 7 exs. (Honnametti, Shola), 9 exs. (Gummane, Shola).

Distribution : Greater parts of India.

Genus *Oniticellus* Serv.

Oniticellus Serville, 1825, Encycl. Mcth., X : 356; Lacordaire, 1856, Gen. Col., III : 110; Reitter, 1892 (1893) : 38, 44; Péringuay, 1900 (1901) : 160; Boucomont et Gillet, 1921 : 21; Boucomont, 1921b

: 207; Arrow, 1931 : 79, 375; Portevin, 1931 : 39, 41; Porta, 1932 : 407, 408; Balthasar, 1935 : 25, 99; Paulian, 1941 : 63; Paulian, 1945 : 129; Janssens, 1953 : 105.

Tiniocellus Péringuay, 1900 (1901), *Trans. S. Afr. Phil. Soc.*, XII, 1901, p. 116. Arrow, 1931 : 79. (Type : *O. spinipes* Roth.).

Subgen. *Euoniticellus* Janssens, 1953, *Parc. Nat. Upemba, Mission Witte, Fasc.*, 11 : 41.

Subgen. *Paroniticellus* Balthasar, 1963, Band 1 : 70.

Diagnosis : Elongate and dorsally flattened insect with a distinctly visible scutellum; elytra fringed before the hind margin and not completely covering the abdomen.

Type : *Scarabaeus cinctus* F.

Range : Europe, Asia and Africa.

Key to the species of *Oniticellus*

- 1 Head bearing transverse carina *O. pallipes* (F)
- Head without carina
- 2 Upper surface opaque *O. spinipes* Roth
- Upper surface very smooth and shining *O. cinctus* (F.)

25. *Oniticellus (Euoniticellus) pallipes* (F)

Scarabaeus pallipes Fabricius, 1781, *Spec. Ins.*, I : 33; Mulsant, 1842 : 96; Mulsant, 1871 : 135; Reitter, 1892 (1893) : 45; d'Orbigny, 1898 : 227; *Oniticellus pallipes* Arrow, 1908, *Ann. Mag. Nat. Hist.*, (8). I : 179; Boucomont, 1921b : 223; Arrow, 1931 : 375; Portevin, 1931 : 41; Porta, 1932 : 408; Balthasar, 1935 : 102; Paulian, 1941 : 64; Balthasar, 1963, Band, 2(1) : 74.

Oniticellus subdeletus Mulsant, 1842, *Hist. Nat. Col. Fr. Lamell.*, : 96.

Oniticellus verticicornis Harold, 1870, *Col. Hefte*, VI : 106.

Oniticellus nitidicollis Arrow, 1908, *Ann. Mag. Nat. Hist.*, (8), I : 179.

Diagnosis : Narrowly elongate insects, generally orange or yellowish and speckled with black or brown; head bearing one or two carinae; pronotum sparingly punctured.

Size : 6.5-9 mm × 3-4.5 mm.

Material examined : 1♂, Kanneri.

Distribution : India.

26. *Oniticellus spinipes* Roth

Oniticellus spinipes Roth, *Arch. f. Nat.*, xvii, i. 1851 : 128.

Tiniocellus spinipes Pe'r., *Trans. Phil. Soc. S. Afr.*, xii, 1900 : 116.

Oniticellus imbellis Bates, *Entom.*, xxiv. 1891, *Suppl.*, : 13.

Oniticellus modestus Arrow, *Ann. Mag. Nat. Hist.*, (8)i. 1908 : 182.

Diagnosis : Upper surface opaque; head without a carina.

Size : 5.5-7.5 mm × 3-4 mm.

Material examined : 591 exs. (Budipadaga, S); 343 exs. (Purani, DD); 31 exs. (Kanneri, MD).

Distribution : North and Peninsular India.

Elsewhere : African continent.

27. *Oniticellus cinctus* (F.)

Scarabaeus cinctus Fabricius, 1775, *Syst. Ent.*, : 30; Boucomont, 1914 : 255; Boucomont et Gillet, 1921 : 23; *Oniticellus cinctus* Arrow, 1931 : 375, 379; Balthasar, 1935 : 103; Paulian, 1945 : 130; Janssens, 1953 : 107; 110.

var. diadema Wiederman, 1819, *Zool. Mag.*, 1, 3 : 159; Boucomont, 1940, 1914 : 255.

Diagnosis : Smooth and shining black insects with a pale yellow external border on each elytron; pronotum unpunctured and elytra deeply striate.

Size : 8-11 mm × 4.5-6 mm.

Material examined : 8 exs. (Purani, DD); 21 exs. (Kanneri, MD); 1 ex. Gombegallu (EG).

Distribution : East and Peninsular India.

Elsewhere : Myanmar Malay Peninsula, Siam, Annam, S. China.

Tribe Onitini

Genus *Onitis* Gill

Onitis Fabricius, 1798, *Suppl. Syst. Ent.*, : 2; Fabricius, 1801, *Syst. Eleuth.*, I : 26; Castelnau, 1840 : 88; Lacordaire, 1856, *Gen. Col.*, III : 103; Lansberge, 1875, *Ann. Soc. Ent. Belg.*, XVIII : 14, 49; i, Bedel, 1892, *Abeille*, XXVII: 251; Reitter, 1892 (1893) : 96; Pèringuey, 1900 (1901) : 108, 118; Arrow, 1931 : 386; Balthasar, 1935 : 87; Janssens, 1937 : 15; Paulian, 1945 : 140.

Oblong insects with stout legs; pronotum with two basal impressions near middle; Scutellum very minute; front tarsi absent.

Type : *Scarabaeus inuus* (Fabr.) (= *O. Sphinx* Fabr.).

Range : Europe, Asia, Africa.

Key to the species of *Onitis*

1. Clypeus without a carina *O. siva* Gill
- Clypeo frontal carina present, interrupted in the middle, a tubercle in the middle 2
2. Narrow, Pronotum very feebly punctured *O. falcatus* (Wulffen)
- Broader, Pronotum well punctured 3
3. Metasternum flat, not grooved *O. virens* Lansb.
- Metasternum longitudinally grooved in front 4
4. Pronotum without a smooth median line; ♂ front femur not toothed *O. philemon* Fabr.
- Pronotum with a smooth median line; ♂ front femur toothed *O. singhalensis* Lansb.

28. *Onitis siva* Gill

Onitis siva Gillet, 1911, *Ann. Soc. Ent. Belg.*, LV : 313; Arrow, 1931 : 388; Janssens, 1937 : 109; Balthasar, 1963, 2 : 53.

Diagnosis : Large black, elongate oval and moderately convex; pygidium entirely smooth; clypeo-frontal carina simple and entire.

Size : 30 mm x 16 mm.

Material examined : 1♂ (Budipadaga, Scrub).

Distribution : S. India.

Remark : Very rare and endemic to Nilgiris.

29. *Onitis falcatus* (Wulffen)

Scarabaeus falcatus Wulffen, 1786, *Descr. Cap. Ins.*, : 14, pl. 2, fig. 17; *Onitis falcatus* Lansberge, 1875, *Ann. Soc. Ent. Belg.*, XVIII : 126; Boucomont et Gillet, 1921 : 17, 19; Arrow, 1931 : 392; Balthasar, 1935 : 93; Janssens, 1937 : 44; Paulian, 1945 : 142; Balthasar, 1963, 2 : 33, pl. IV, Fig. 1.

Onitis himaleicus Redtenbacher, 1848, *Hugel's Kaschmir*, IV, 2 : 518.

Onitis sphinx Herbst, 1789, *Käfer*, II : 186.

Diagnosis : Clypeo-frontal carina interrupted and with a tubercle in the middle; metasternum not transversely excavated in the middle; pronotum very feebly punctured.

Size : 16-23 mm x 8-12 mm.

Material examined : 1 ex. (Purani, DD); 7 exs. (Kanneri, MD); 11 exs. Gombegallu (EG); 14 exs. (Honnamenti, Shola), 5 exs. (Gummane, Shola).

Distribution : Greater parts of India.

Elsewhere : Myanmar, Malay Peninsula, Philippines, S. China.

30. *Onitis philemon* Fabr.

Onitis philemon Fabricius, 1801, *Syst. Eleut.*, I : 30; Arrow, 1931 : 393; Balthasar, 1935 : 95; Janssens, 1937 : 53; Paulian, 1945 : 144; Balthasar, 1963, 2 : 41, pl. V, Fig. 2.

Onitis distinctus Lansb., 1875, *Ann. Soc. Ent. Belg.*, XVIII : 138.

Diagnosis : Clypeo-frontal carina interrupted in the middle; pronotum without a smooth median line; pronotum well punctured; metasternum longitudinally grooved in front.

Size : 14-19 mm x 7.5-10.5 mm.

Material examined : 43 exs., (Budipadaga, S); 15 exs. (Purani, DD); 5 exs. (Kanneri, MD); 3exs. Gombegallu (EG).

Distribution : India.

Elsewhere : Sri Lanka

31. *Onitis singhalensis* Lansb.

Onitis singhalensis Lansberge, 1875, *Ann. Soc. Ent. Belg.*, XVIII : 140; Arrow, 1931 : 394; Janssens, 1937 : 53.

Diagnosis : Clypeo-frontal carina interrupted in the middle; pronotum without a smooth median line; metasternum longitudinally grooved in front.

Size : 19-22 mm x 10-12 mm.

Material examined : 3 exs., (Budipadaga, S); 1 ex. (Purani, DD); 1ex. (Kanneri, MD); 7 exs. Gombegallu (EG); 14 exs. (Honnamenti, Shola), 7 exs (Gummane, Shola).

Distribution : S. India.

32. *Onitis virens* Lansb.

Onitis virens Lansberge, 1875, *Ann. Soc. Ent. Belg.*, XVIII : 135; Boucomont et Gillet, 1921 : 19; Arrow, 1931 : 396; Balthasar, 1935 : 94; Janssens, 1937 : 52; Paulian, 1945 : 144.

Onitis amplexens Lansberge, l. c. : 136.

Diagnosis : Black and moderately shining insects; Clypeo-frontal carina narrowly interrupted in the middle; a short transverse clypeal carina just before the interrupted carina and conical tubeclie just behind it.

Size : 18-23 mm × 10-13 mm.

Material examined : ♂♂

Distribution : Eastern and Peninsular India.

Elsewhere : Myanmar, S. China.

Tribe Onthophagini

Genus *Caccobius* Thomson

Caccobius Thomson, 1863, *Skand. Col.*, V : 34; Harold, 1867, *Col. Hefte*, I : 5; Harold, 1867, I. c. II : 1; Mulsant, 1871 : 75; Jekel, 1872, *Rev. Mag. Zool.* : 405 : Waterhouse, 1875, *Trans. Ent. Soc., London* : 73; Reitter, 1892 (1893) : 39, 91; d'Orbigny, 1898 : 127; Peringuey, 1900 (1901) : 275; Peringuey, 1908 : 565; d'Orbigny, 1913 : 17; Boucomont et Gillet, 1921 : 27; Arrow, 1931 : 141; Portevin, 1931 : 39; Porta, 1932 : 412; Matsumura, 1936 : 61; Paulian, 1945 : 81; Balthasar, 1949 : 1.

Onthophagus (ex parte), *div. auctores* : subgen. *Caccophilus* Jekel, 1872, I. c. : 410, d'Orbigny, 1898 : 130; d'Orbigny, 1913 : 21; Balthasar, 1935e : 18; Balthasar, 1949 : 7.

subgen. *Caccocnemus* Jekel, 1872, I. c. : 418.

sbg. *Tomogonlls* d'Orbigny, 1904, *Ann. Mus. Civ. Gen.*, XLI : 284.

Oblong insects with stout legs; pronotum with two basal impressions near middle; Scutellum very minute; front tarsi absent.

Type : *Scarabaeus schreberi* L.

Range : The old world.

Key to the species of *Caccobius*

1. More or less setose above 2
- Very smooth above without setae or hairs *C. rufipennis* (Motsch.)
2. Clypeus more or less notched or bilobed 3
- Clypeus not notched or bilobed 8
3. Pronotum simply punctured 4
- Pronotum granulate at sides 5
4. Metasternum not punctured in the middle; ? with a cephalic horn *C. unicornis*
- Metasternum punctured in the middle; ? not horned *C. inermis* Arrow
5. Pronotum closely punctured 6

- Pronotum not closely punctured 7
- 6. Elytra brown and variegated *C. meridionalis* Bouc.
- Elytra entirely black *C. ulti* Sharp
- 7. Elytra with orange apical patch *C. vulcanus* (F.)
- Elytra without apical patch *C. indicus* Har.
- 8. Clypeus rounded; setae scarcely visible *C. aterrimus* (F.)
- Clypeus pointed; setae long above *C. diminutivus* (Walk.)

33. *Caccobius (Caccophilus) aterrimus* (F)

Copris aterrimus Fabricius, 1798, *Ent. Syst. Suppl.*, : 35, 236; Harold, 1867, *Col. Hefte*, II : 9; Jekel, 1872, *Rev. Mag. Zool.*, : 414; Boucomont, 1914 : 415; Arrow, 1931 : 142, 143.

Caccobius haroldi Jekel, 1872, l.c. : 416.

Diagnosis : More or less setose, clypeus rounded; setae scarcely visible above.

Size : 4.5 mm x 3 mm.

Material examined : 8 exs. (Budipadaga, S); 11 exs. (Purani, DD).

Distribution : S. India.

Elsewhere : Sri Lanka.

34. *Caccobius (Caccophilus) diminutivus* (Walk)

Copris diminutivus Walker, 1858, *Ann. Mag. Nat. Hist.*, (3)ii : 208. *Onthophagus setulosus* Motschulsky, 1863, *Bull. Soc. Nat. Mosc.*, xxxvi, 2 : 459; *Caccobius (Caccophilus) diminutiveus* Balthasar, 1963, 2 : 141

Diagnosis : Black and shining; upper surface of the body clothed with erect, rather sparse but regular and long hairs; clypeus pointed.

Size : 3-3.5 mm x 2 mm.

Material examined : 284 exs. (Budipadaga, S); 8 exs. (Purani, DD).

Distribution : Greater part of India.

35. *Caccobius (Caccophilus) indicus* Har.

Caccobius indicus Harold, 1867, *Col. Hefte*, ii : 12. Arrow, 1931 : 142, 152; Balthasar, 1949 : 13, 35. Balthasar, 1963, 2 : 35.

Diagnosis : More or less hairy above; pronotum granulate at the sides, closely punctured, elytra without an apical patch.

Size : 4-6 mm x 2.5-3 mm.

Material examined : 2 exs. (Honnametti, Shola).

Distribution : S. India.

36. *Caccobius (Caccophilus) inermis* Arrow

Caccobius inermis Arrow, 1931, *Fauna of British India, Lamell.*, III : 142, 147; Balthasar, 1933 d : 51; Balthasar, 1949 : 9, 50; *Caccobius (Caccophilus) inermis* Balthasar, 1963 : 146.

Diagnosis : More or less setose above; clypeus more or less bilobed; metasternum well punctured; male not horned.

Size : 3 mm x 2 mm.

Material examined : 2000+ exs., (Budipadaga, S); 45 exs. (Purani, DD); 27 exs. (Kanneri, MD); 2 exs. (Gummane, Shola).

Distribution : Greater part of India.

Elsewhere : Sri Lanka.

37. *Caccobius (Caccophilus) meridionalis* Bouc.

Caccobius meridionalis Boucomont, 1914, *Ann. Mus. Civ. Genova*, VI (XLVI) : 239; Arrow, 1931 : 142, 148; *Caccobius (Caccophilus) meridionalis* Balthasar, 1949 : 8, 36; Balthasar, 1963 : 148.

Diagnosis : More or less setose above; clypeus more or less bilobed; pronotum granulate at sides; elytra brown, variegated.

Size : 4-5 mm x 2.5-3 mm.

Material examined : 2000+ exs., (Budipadaga, S); 273 exs. (Purani, DD); 645 ex. (Kanneri, MD); 47 exs. (Gummane, Honnametti, Shola).

Distribution : Greater part of India.

Elsewhere : Sri Lanka.

38. *Caccobius (s. str.) rufipennis* (Motsch.)

Onthophagus rufipennis Motschulsky, 1858, *Etudes entom.* VII : 53; *Caccobius rufipennis* Harold (nec Motschulski) 1867, *Col. Hefte*, II : 8; Arrow, 1931 : 142, 158; Balthasar, 1949 : 6, 25; Balthasar, 1963 : 129-130.

Diagnosis : Very smooth above without setae or hairs; clypeus excised in front; punctures of the pronotum very few and scattered.

Size : 3 mm × 2 mm.

Material examined : 61 exs., (Budipadaga, S); 2 exs. (Kanneri, MD).

Distribution : Sri Lanka.

First report of this species from India

39. *Caccobius (Caccophilus) ulti* Sharp

Caccobius ulti Sharp, 1875, Col. Hefte, XIII, : 50; Arrow, 1931 : 142, 150; *Caccobius (Caccophilus) ulti* Balthasar, 1949 : 12, 32; Balthasar, 1963 : 135.

Diagnosis : Pronotum granulate at sides; elytra entirely black, not shining.

Size : 4.5 mm × 5 mm

Material examined : 6 exs., (Budipadaga, S); 64 exs. (Kanneri, MD)

Distribution : South India.

40. *Caccobius (Caccophilus) unicornis* F.

Copris unicornis, Fabricius, 1798, Ent, Syst. Suppl., : 33. Fabricius, 1801, Syst. Elent, i. : 52; *Onthophagus unicornis* Boucomont, 1914, Ann. Mus. Civ. Genova, xlvi : 236; *Caccobius unicornis* Arrow, 1931 : 142, 145; Balthasar, 1933d : 51; Paulian, 1945 : 83; Balthasar, 1949 : 10, 44;

Onthophagus nitidiceps Fairmaire, 1893, Ann. Soc Ent. Belg., xxxvii : 304; Boucomont, 1914 : 313, 314; Boucomont et Gillet, 1921 : 34, 59;

Onthophagus yamauchii Matsumura, 1936, Ins. Matsumurana, XI : 66.

Diagnosis : Head rather short and broad; clypeus slightly bilobed; metasternum not punctured in the middle.

Size : 3-3.5 mm × 2-2.5 mm.

Material examined : 41 exs., (Budipadaga, S); 3 exs. (Purani, DD).

Distribution : India.

Elsewhere : Sri Lanka, Java, Borneo, Philippine Islands, Malay Peninsula.

41. *Caccobius (Caccophilus) vulcanus* (F.)

Copris vulcanus Fabricius, 1801, Syst. Eleut., i : 41. Harold, 1867, col. Hefte, II : 11; *Caccobius vulcanus* Arrow, 1931 : 142, 151; Blathasar, 1935e : 195; *Caccobius (Caccophilus) vulcanus* Balthasar, 1949 : 13, 34.

Copris bicuspis Wied., 1823, Zool. Mag., ii, I : 18.

Caccophilus mutans Sharp, 1875, Col. Hefte, xiii : 51.

Size : 4-5 mm × 3 mm.

Diagnosis : Oval compact and convex; pronotum fairly strongly sevenly and closely punctured and punctures replaced by granules at the sides; elytra with orange apical patch.

Material examined : 1500+ exs., (Budipadaga, S); 342 exs. (Purani, DD); 1545 exs. (Kanneri, MD); 54exs. Gombegallu (EG).

Distribution : India.

Elsewhere : Sri Lanka.

Genus *Onthophagus* Latr.

Onthophagus Latreille, 1802, *Hist. Nat. Crust. Et Ins.*, III : 141; Mulsant, 1842 : 102; Erichson, 1848, III: 762; Lacordaire, 1856, *Gen. Col.*, III : 107; Mulsant-Rey, 1871: 78; Reitter, 1892 (1893) : 47; d'Orbigny, 1898 : 132; d; Orbigny, 1900 : 289; Pèringuey, 1900 (1901) : 168; Pèringuey, 1908: 560; Reitter, 1909 : 325; Bedel, 1911 : 25; d'Orbigny, 1913 : 49; d'Orbigny, 1915 : 378 (Suppl.); Boucomont, 1914 : 238; *Boucomont et Gillet*, 1921 : 1; Boucomont, 1924a : 669; Arrow, 1931 : 1930 : 159; Portevin, 1931 : 42; Porta, 1932 : 408; Balthasar, 1935d : 303; Savèenko, 1938 : 46, 136; Paulian, 1941 : 66; Paulian, 1945 : 85; Endrödi, 1956 : 94; Tesar, 1957 : 127; Balthasar, 1963, 2 : 153.

Monopus Erichson, 1848, *Naturg. Ins. Deuschl. Col.* III : 763.

Psilax Erichson, 1848, l.c.

Matashia Matsumura, 1938, *Ins. Matsum.*, XII : 63.

subgen. *Prongoderus* Lansberge, 1883, *Not Leyd. Mus. Mus.*, V : 14 [Type : *Onthophagus. rilsemai* Lansb.]; d'Ornigny, 1913 : 493; Boucomont, 1914 : 261; Marcus, 1917, A (1919) : 1; Marcus, 1920, *D. Ent. Seitschr.*, : 177, 1921, *Ibid.* 163; Balthasar, 1963, l. c. : 158.

Tauronthophagus Shipp, 1895, *Entomologist*, XXVIII : 179.

Subgen. *Diastellopalpus* Lansberge, 1886, *Not. Leyd. Mus.*, VIII : 91; d'Orbigny, 1913 : 577; Marcus, 1920, 1921 : l.c.

subgen. *Serrophorus* Balthasar, 1935, *Fol. Zool. Hydrob.*, VIII : 306 [type : *O. seniculus* (F)]; Paulian : 86; Balthasar, 1963, l. c. : 160.

subgen. *Micronthophagus* Balthasar, 1935, l.c. : 306 [*O. hystrix* Bouc.]; Paulian, 1945 : 86; Balthasar, 1963, l. c. : 165.

subgen. *Strandius* Balthasar, 1935, l.c. 307 [type : *O. lenzi* Har.]; Paulian, 1945 : 86; Balthasar, 1963, l. c. : 160.

Gonocyphus lansburge, 1885, *Ann. Mus. Clv. Genova*, XXII : 382.

subgen. *Phaneomorphus* Balthasar, 1935, l.c. : 307 [type : *O. sycophanta* Fairm.]; Balthasar, 1963, l. c. : 161.

Gonocyphus Lansburge, 1885, l.c.; Paulian, 1945 : 86.

subgen. *Gibbonthophagus* Balthasar, 1935, l.c. : 308 [type : *O. atripennis* waterh.]; Balthasar, 1963, l. c. : 163.

subgen. *Onthophagiellus* Balthasar, 1935, l.c. : 308 [type : *O. crassicollis* Bouc.]; Paulian. 1945 : 87; Balthasar, 1963, l. c. : 166.

subgen. *Colobonthophagus* Balthasar, 1935, l.c. : 308 [type : *O. tragus* (F.)]; Paulian. 1945 : 87; Balthasar, 1963, l. c. : 164.

subgen. *Parascatonomus* Paulian, 1932, *Bull. Soc. Ent. Fr.*, : 205 [type : *O. discendens* Sharp]; Paulian, 1945 : 87, Balthasar, 1963, l. c. : 164.

subgen. *Euonthophagus* Balthasar, 1959, *Acta Ent. Mus. Nat. Prague*, 33 : 467 [type *O. amyntas* (Oliv.)]; Balthasar, 1963, l. c. : 167.

subgen. *Digitonthophagus* Balthasar, 1959, l.c. : 464 (Type : *Onthophagus bonasus* (F)); Balthasar, 1963, l. c. : 159.

subgen. *Paraphanaeomorphus* Balthasar, 1959, l.c. : 465 [*O. phanaeicollis* Lansb.]; Balthasar, 1963, l. c. : 162.

subgen. *Paronthophagus* Balthasar, 1959, l.c. : 466 [type : *O. deliensis* Lansb.]; Balthasar, 1963, l. c. : 177.

subgen. *Endrodius* Balthasar, 1959, l.c. : 465 [type : *O. praedatus* Har.]; Balthasar, 1963, l. c. : 164.

subgen. *Indachorius* Balthasar, 1941, *Zool. Anz.*, 133 : 161 [type : *O. nefarious* Balth.]; Balthasar, 1963, l. c. : 166.

Onthocellus Balthasar, 1959, l. c. : 466.

subgen. *Pseudonthophagus* Balthasar, 1959, l.c. : 466 [type : *O. penicillatus* Har.]; Balthasar, 1963, l. c. : 167.

Chalcoderus Erichson, 1848, *Naturg. Ins. Deutschl. Col.*, III : 763; Boucomont, 1914 : 272.

The largest genus of Scarabaeidae; short, compact and broadly oval; pronotum with a single lateral carina and without a basal groove; elytra with a single lateral carina and not narrowed at the shoulders; terminal margins of the front tibia not at right angles to the inner margin and anterior margin of the prothorax not hollowed ventrally.

Type : *Scarabaeus taurus* L. (Europe).

Range : Almost world wide (except Polynesia).

Key to the species of *Onthophagus*

1. Pronotum wholly or partially granular or rugose..... 2
- Pronotum punctured without granules, asperities or rugosity 15

2. Pronotum entirely granular or rugose without distinct punctures 3
- Pronotum partially granular or rugose with some punctures or smooth areas 6
3. Upper surface clothed with very dense pile *O. tarandus* (F.)
- Upper surface not clothed with very dense pile 4
4. Pronotum with an anterior pointed process *O. tricornis* (Wied)
- Pronotum without an anterior pointed process 5
5. Pronotum rather shining *O. bronzeus* Arrow
- Pronotum opaque *O. griseosetosus* Arrow
6. Base of pronotum strongly produced in the middle *O. pactolus* (F.)
- Base of pronotum not strongly produced in the middle 8
7. Front angles of the pronotum not produced, very blunt *O. chrysurus* Arrow
- Front angles of the pronotum more or less produced 9
8. Extremely smooth or shining *O. brevicollis* Arrow
- Not extremely smooth or shining *O. chrysurus* Arrow
9. Elytra more or less opaque 10
- Elytra very shining 14
10. Upper surface not uniformly dark 11
- Upper surface uniformly dark 13
11. Pronotum light brown with black punctures *O. rectecornutus* Lansb.
- Pronotum dark green or coppery 12
12. Front angles of the pronotum not very sharp *O. gazella* (F.)
- Front angles of the pronotum very sharp *O. bonasus* (F.)
13. Not metallic *O. ramosus* (Wied.)
- Slightly metallic *O. abreui* Arrow
14. Each elytron with four or more yellow patches *O. kchatriya* Bouc.
- Each elytron with two red patches *O. madoqua* Arrow
15. 7th elytral stria indistinct *O. amphicoma* Bouc.
- 7th elytral stria distinct 16

16. 7th elytral stria straight and parallel with the 6th stria 17
 - 7th elytral stria more strongly curved than the 6th stria 19
17. Upper surface bearing fine setae *O. tritinctus* Bouc.
 - Upper surface without hairs or setae 18
18. Pronotum very convex, evenly punctured *O. mauritii* Bouc.
 - Pronotum not very convex, unevenly punctured *O. rana* Arrow
19. Punctures of pronotum large, close umbilicate 20
 - Punctures of pronotum not large or close umbilicate 21
20. Clypeus not bilobed *O. furcillifer* Bates
 - Clypeus more or less bilobed *O. circulifer* Arrow
21. Upper surface without hair, smooth or with only very minute, scant and inconspicuous setae 22
 - Upper surface distinctly hairy or setose 29
22. Upper surface not entirely dark 23
 - Upper surface entirely dark 24
23. Minute *O. transcaspicus* Koenig.
 - Not minute *O. politus* (F.)
24. Pronotum finely and rather sparsely punctured 25
 - Pronotum well and not sparsely punctured 28
25. Elytral suture with a minute elevation behind the base *O. bengalensis* Har.
 - Elytral suture without a minute elevation behind the base 26
26. Upper surface dull *O. laevigatus* (F.)
 - Upper surface shining 27
27. Metallic green blue or coppery *O. dama* (F.)
 - Black *O. quadridentatus* (F.)
28. Elytral suture with a minute elevation behind the base *O. hindu* Arrow
 - Elytral suture without a minute elevation behind the base *O. semicinctus* d'Orb.
29. Pronotum pale at sides 30

- Pronotum uniformly colored 33
- 30. Sutural interval not entirely dark; pronotum with arcuate anterior carina *O. gracilipes* Bouc.
- Sutural interval entirely dark; pronotum without an arcuate anterior carina 31
- 31. Elytra with a narrow transverse black band *O. fasciatus* Bouc.
- Elytra without a narrow transverse black band 32
- 32. Elytra with a median black band and basal and apical spots *O. comottoi* Lansb.
Elytra dark except at the base and apex *O. favrei* Bouc.
- 33. Pygidium with a basal ridge 34
- Pygidium without a basal ridge 42
- 34. Pronotum evenly and uniformly punctured 35
- Pronotum unevenly and unequally punctured 38
- 35. Pronotum finely and closely punctured 36
- Pronotum not finely and closely punctured 37
- 36. Pronotum without an anterior oblique basal impression on each side; with two widely separated tubercles in the ? *O. mopsus* (F.)
- Pronotum with a faint anterior oblique basal impression on each side; with two widely separated tubercles in the ? *O. turbatus* Walk.
- 37. Uniformly dark above *O. ensifer* Bouc.
- Not uniformly dark above 38
- 38. Elytra opaque *O. frugivorus* Arrow
- Elytra shining 39
- 39. Elytra with a transverse dark band *O. bifasciatus* (F.)
- Elytra without a transverse dark band *O. centricornis* (F.)
- 40. Pygidium and lower surface entirely dark *O. ludio* Bouc.
- Pygidium and lower surface more or less pale 41
- 41. Pronotum rather less closely punctured; ? clypeus not pointed *O. cervus* (F.)
- Pronotum rather more closely punctured; ? clypeus pointed *O. falsus* Gillet

42. Head granular *O. pusillus* (F.)
 - Head punctured *O. truncaticornis* (Schall.)

42. *Onthophagus (s. str.) abreuri* Arrow

Onthophagus abreuri Arrow, 1931, Fauna Brit. India, (Coleoptera : Lamellicornia), 3 : 239-240; *Onthophagus (s. str.) abreuri* Balthasar, 1963, 2 : 260.

Diagnosis : Upper surface smooth; punctures of the pronotum not dense or asperate; elytra more or less opaque;

Size : 10-12 mm. × 5.5-7 mm.

Material examined : 15 exs., (Budipadaga, S); 3exs. (Purani, DD); 1 ex. (Gummane, Shola).

Distribution : Greater part of India.

43. *Onthophagus (s. str.) amphicoma* Bouc.

Onthophagus amphicoma Boucomont, 1914, Ann. Mus. Civ. Genova, 3, VI (XLVI) : 239; Arrow, 1931 : 262; *Onthophagus (s. str.) amphicoma* Balthasar, 1963, 2 : 269.

Diagnosis : Clypeus emarginated; pronotum not extremely convex; 7th elytral striae indistinct.

Size : 4 mm × 2.5 mm.

Material examined : 2 exs. Gombegallu (EG).

Distribution : S. India (Kerala).

Remarks : New report to Karnataka.

44. *Onthophagus (Colobonthophagus) bengalensis* Har.

Onthophagus bengalensis Harold, 1886, Berl. Ent. Zeits., XXX : 146 (??); Boucomont, 1914a : 230; Arrow, 1931 : 279; 286; *Onthophagus (Colobonthophagus) bengalensis* Balthasar, 1946 : 22 (??); Balthasar, 1963, 2 : 290.

Diagnosis : Upper surface entirely black; clypeo-frontal carina strongly curved; elytral suture with a minute elevation near the base.

Size : 11 mm × 7 mm.

Material examined : 16 exs., (Budipadaga, S); 1ex. (Purani, DD).

Distribution : South India (Nilgiris).

45. *Onthophagus (Paraphanaeomorphus) bifasciatus* (F.)

Scarabaeus bifasciatus Fabricius, 1781, *Spec. Ins.*, I : 25; Arrow, 1931 : 327;

Balthasar, 1963, 2 : 292.

Onthophagus birmanicus Harold, 1879, *Col. Hefte*, XVI : 226.

Diagnosis : Pronotum uniformly coloured, middle process not divided; elytra shining; pygidium without a pale median stripe

Size : 5-7 mm × 3-4 mm.

Material examined : 1 ex. (Honnametty, Shola).

Distribution : India.

Elsewhere : Myanmar.

46. *Onthophagus (s. str.) brevicollis* Arrow

Onthophagus brevicollis Arrow, 1907, *Ann. Mag. Nat. Hist.*, (7), XIX : 422; Arrow, 1931 : 210, 221; Balthasar, 1963, 2 : 298.

Diagnosis : Pronotum with granules distributed evenly; extremely smooth and shining.

Size : 9-14 mm × 5-8 mm.

Material examined : 1184 exs. (Purani, DD); 93 exs. (Kanneri, MD); 2exs. Gombegallu (EG); 107 exs. (Honnametti, Shola), 54 exs. (Gummane, Shola).

Distribution : South India.

47. *Onthophagus (s. str.) unifasciatus* (Schall.)

Scarabaeus unifasciatus Schaller, 1783, *Abh. Hall. Nat. Ges.*, I : 240; Fabricius, 1792, *Ent. Syst.*, I : 49. Arrow, 1931 : 327, 341; Balthasar, 1963, 2 : 571.

Onthophagus prolixus Walker, 1858, *Ann. Mag. Nat. Hist.*, (2) iii : 208; Harold, 1869, *Cat. Col.*, IV : 1038.

Diagnosis : Pronotum evenly and uniformly punctured; elytra with a transverse dark band; thoracic elevation longitudinally impressed; pygidium with a basal ridge.

Size : 6-9 mm × 4-5 mm.

Material examined : 1 ex. (Honnametti, Shola).

Distribution : India.

Elsewhere : Sri Lanka.

48. *Onthophagus (Digitonthophagus) bonasus* (F.)

Scarabaeus bonasus Fabricius, 1775, *Syst. Ent.*, : 23; d'Orbigny, 1898, *L'Abeille*, XXIX, 218; Boucomont et Gillet, 1921 41; Arrow, 1931 : 229, 231, pl. XIII, figs. 5, 6; Paulian, 1945 : 88, 101; Balthasar, 1963, 2 : 296, 297, pl. XII, fig. 5.

Diagnosis : Upper surface smooth; pronotum not shining and its front angles very sharp.

Size : 12-17 mm × 7.5-9.5 mm,

Material examined : 6 exs. (Budipadaga, S).

Distribution : India.

Elsewhere : Pakistan, Sri Lanka.

49. *Onthophagus (s. str.) bronceus* Arrow

Onthophagus bronceus Arrow, 1907, *Ann. Mag. Nat. Hist.*, (7), XIX : 429; Arrow, 1931 : 184, 192; Balthasar, 1963, 2 : 299.

Diagnosis : Head gently rounded at the sides; pronotum entirely granular, very shining, without a pointed anterior process; metasternum almost smooth.

Size : 10-12 mm × 6-7.5 mm.

Material examined : 141 exs., (Budipadaga, S); 555 exs. (Purani, DD); 797 exs. (Kanneri, MD); 78 exs. Gombegallu (EG); 1023 exs. (Honnametti, Shola), 96 exs (Gummane, Shola).

Distribution : South India

50. *Onthophagus (Digitonthophagus) gazella* (F.)

Scarabaeus gazella Fabricius, 1787, *Mant. Inst.*, II 377; Reitter 1892 (1893) : 62; d'Orbigny, 1913 : 249; Paulian, 1936, *Bull. Acad. Malgache*, XVIII : 132; Balthasar, 1963, 2 : 365.

Scarabaeus catta Fabricius, 1787, *Mant. Ins.*, I : 12 (syn. not evident); Arrow, 1931 : 229, 230.

Scarabaeus dorcas Olivier, 1789, *Ent. I*, 3 : 121

Copris metallicus Fabricius, 1798, *Ent. Syst., Suppl.*, : 28.

Copris antilope Fabricius, 1798, *I.c.* : 32.

Copris intermedius Reiche, 1840, *Rev. Zool.*, : 243

Var. *Lusinganus* d'Orbigny' 1905, *Ann. Soc. Ent. France*, LXXIV : 495; d'Orbigny' 1913 : 249.

Diagnosis : Upper surface smooth ; pronotum not shining and its front angles not very sharp; elytra opaque.

Size : 8-13 mm × 5-8 mm.

Material examined : 92 exs., (Budipadaga, S); 21 exs. (Purani, DD); 7 exs. (Kanneri, MD).

Distribution : India.

Elsewhere : Pakistan.

51. *Onthophagus (s. str.) centricornis* (F.)

Copris centricornis Fabricius, 1798, *Ent. Syst. Suppl.*, : 33; Boucomont, 1914a : 235; Arrow, 1931 : 327, 343; Balthasar, 1963, 2 : 305.

Copris luteipennis Wiedemann, 1823, *Zool. Mag.*, II, I : 20.

Onthophagus minutus Motschulsky, 1858, *Etud. Ent.*, VII : 54.

Diagnosis : Clypeus notched and feebly excised in the middle; elytra pale; ē with a short erect horn on the head; pygidium with a basal ridge.

Size : 2.5-3 mm × 1.5-2 mm.

Material examined : 64 exs., (Budipadaga, S); 4 exs. (Purani, DD); 1 ex. (Kanneri, MD); 1 ex. Gombegallu (EG); 2 exs (Gummane, Shola).

Distribution : Peninsular India.

Elsewhere : Sri Lanka.

52. *Onthophagus (s. str.) cervus* (F.)

Copris corvus Fabricius, 1798, *Ent. Syst. Suppl.*, : 31; d'Orbigny' 1898 : 244; Boucomont, 1944a : 227; Arrow, 1931 : 328, 348; Balthasar, 1963, 2 : 307.

Copris cervus Fabricius, 1801, *Syst. Eleuth.*, i : 46.

Copris nuchidens Fabricius, 1798, *Ent. Syst. Suppl.*, : 31.

Onthophagus ceylonicus Harold, 1877, *Ann. Mus. Civ. Genova*, x : 61; Boucomont, 1914a : 225.

Diagnosis : Pronotum with an anterior prominense, less closely punctured, unequally punctured; pygidium pale.

Size : 6-7 mm × 3.5-4.5 mm.

Material examined : 2 exs., (Budipadaga, S); 3 exs. (Kanneri, MD).

Distribution : India, Andaman,

Elsewhere : Sri Lanka

53. *Onthophagus (s. str.) chrysurus* Arrow

Onthophagus chrysurus Arrow, 1931, *Fauna Brit. India (Coleoptera : Lamellicornia)*, III : 211-212; Balthasar, 1963, 2 : 310.

Diagnosis : Elongate oval, deeply waisted and very convex; pygidium clothed with long yellow hairs, elytra yellow.

Size : 8 mm × 4.5 mm.

Material examined : 3 exs., (Budipadaga, S).

Distribution : NE India.

Remark : New report from Western Ghats.

54. *Onthophagus (s. str.) circulifer*, Arrow

Onthophagus circulifer Arrow, Fauna Brit. India (Coleoptera : Lamellicornia), III, 1931 : 274-275; Balthasar, 1963, 2 : 311.

Diagnosis : Pronotum with large umbilicate punctures; pygidium hairy, clypeus more or less bilobed

Size : 5.5-6 mm × 3-3.5 mm.

Material examined : 15 exs., (Budipadaga, S).

Distribution : India.

Elsewhere : Myanmar.

55. *Onthophagus (Paraphanacomorphus) comottoi* Lansb.

Onthophagus comottoi Lansberge, 1885, Ann. Mus. Civ. Genova, XXII : 382; Boucomont et Gillet, 1921 : 49; Arrow, 1931: 314; Balthasar, 1963, 2 : 315.

Diagnosis : Pronotum with a sharp median tubercle; elytra with a median black band and median and apical spots;

Size : 5.5-8 mm × 3.5-4.5 mm.

Distribution : Myanmar.

Remark : New report to India

56. *Onthophagus (s. str.) dama* (F.)

Copris dama Fabricius, 1798, Ent. Syst. Suppl., : 32.

Onthophagus dama d'Orbigny, 1898, L'Abeille, XXIX : 217; Arrow, 1931 : 279, 280; Balthasar, 1963, 2 : 325, pl. XII, fig. 6.

Onthophagus zubaci Balthasar, 1932, Stett. Ent. Zeit., 93 : 151; Arrow, 1932 : 422.

Diagnosis : Upper surface smooth and without any hair, pronotum finely and sparsely punctured; metallic blue green or coppery.

Size : 8.5-11 mm × 5-7 mm.

Material examined : 96 exs., (Budipadaga, S); 11 exs. (Purani, DD); 61 exs. (Kanneri, MD); 5 exs. Gombegallu (EG); 2 exs. (Honnametti, Shola), 12 exs. (Gummane, Shola).

Distribution : India.

Elsewhere : Nepal, Bhutan, Sri Lanka.

57. *Onthophagus (s. str.) ensifer* Bouc.

Onthophagus ensifer Boucomont, 1914, *Ann. Mus. Civ. Genova*, XLVI : 220; Arrow, 1931 : 334; Balthasar, 1963, 2 : 342.

Diagnosis : Black, pronotum not uniformly and finely punctured; pygidium with basal ring.

Size : 5-7 mm × 3-4 mm.

Material examined : 2161 exs., (Budipadaga, S); 1 ex. (Purani, DD); 1151 exs. (Kanneri, MD); 541 exs. Gombegallu (EG); 10620 exs. (Honnametti, Shola), 313 exs (Gummane, Shola).

Distribution : South India.

Note : specimens from the scrub lighter in colour and punctures on the pronotum deeper; ê horn shorter and broader.

58. *Onthophagus (s. str.) falsus* Gillet

Onthophagus falsus Gillet, 1925, *Ann. Soc. Sci. Brux.*, XLIV : 236; Arrow, 1931 : 328, 350; Balthasar, 1963, 2 : 345-346.

Onthophagus cervus d'Orbigny', (not Fabricius), 1898, L'abeille, XXIX : 214.

Diagnosis : Pronotum unequally punctured; pygidium and lower surface more or less pale; head of the male two horned.

Size : 5.5-7.5 mm. × 3-4 mm.

Distribution : North and NE India.

Elsewhere : Pakistan, Bangladesh.

Remark : O. falsus is considered as the representative of its closest ally, O. cervus in the North and East. Now this species is newly reported from South India.

59. *Onthophagus (s. str.) fasciatus* Bouc.

Onthophagus fasciatus Boucomont, 1914, *Ann. Mus. Civ. Genova*, XLVI : 231; Arrow, 1931 : 310-311; Balthasar, 1963, 2 : 347.

Diagnosis : Sutural interval entirely dark; base, apex and sides of elytra pale, with a narrow transverse black band.

Size : 5-6.5 mm × 3-4 mm.

Material examined : 8 exs. (Purani, DD); 197 exs. (Kanneri, MD); 47 exs. Gombegallu (EG); 80 exs. (Honnametti, Shola), 58 exs. (Gummane, Shola).

Distribution : India.

60. *Onthophagus (s. str.) favrei* Bouc.

Onthophagus favrei Boucomont, 1914, Ann. Mus. Civ. Genova, XLVI : 225; Arrow, 1931 : 311, 315; Balthasar, 1963, 2 : 347-348.

Diagnosis : Pronotum with a sharp median tubercle; elytra dark except the base and apex.

Size : 5-7.5 mm × 3-4.5 mm.

Material examined : 1 ex. (Purani, DD); 8 exs. (Kanneri, MD); 11 exs. Gombegallu (EG).

Distribution : South India.

Elsewhere : Sri Lanka

61. *Onthophagus (Paraphanaeomorphus) frugivorus* Arrow

Onthophagus frugivorus Arrow, 1931, Fauna Brit. India (Coleoptera : Lamellicornia), III : 327, 336- 337; Balthasar, 1963, 2 : 356.

Diagnosis : Pronotum not closely and finely punctured; elytra opaque, intervals bearing minute granules.

Size : 6-7 mm × 4 mm.

Material examined : 2 exs., (Budipadaga, S).

Distribution : NE India.

Remark : New report to South India.

62. *Onthophagus (s. str.) furcillifer* Bates

Onthophagus furcillifer Bates, 1891, Entom., XXIV, Suppl., : 11; Arrow, 1931 : 270, 273; Balthasar, 1963, 2 : 360.

Diagnosis : Punctures of pronotum large, close and umbilicate; pygidium hairy; clypeus not bilobed.

Size : 5.5-6 mm × 3.5 mm.

Material examined : 461 exs., (Budipadaga, S); 238 exs. (Purani, DD); 256 exs. (Kanneri, MD); 7 exs. Gombegallu (EG); 5 exs. (Gummane, Shola).

Distribution : India.

63. *Onthophagus (s. str.) gracilipes* Bouc.

Onthophagus gracilipes Boucomont, 1914, Ann. Mus. Civ. Genova, XKVI : 219; Boucomont et Gillet, 1921 : 60; Arrow, 1931 : 311, 320; Balthasar, 1935d : 346; Paulian, 1945 : 90, 115; Balthasar, 1963, 2 : 372.

Diagnosis : Sutural intervals not entirely dark; pronotum with an arcuate anterior carina.

Size : 6-7.5 mm × 4-4.5 mm.

Material examined : 1 ex. (Purani, DD); 2 exs. (Kanneri, MD).

Distribution : Myanmar, Indo-China.

Remarks : New report to India.

64. *Onthophagus (s. str.) griseosetosus* Arrow

Onthophagus griseosetosus Arrow, 1931, Fauna Brit. India (Coleoptera : Lamellicornia), III : 192-193; Balthasar, 1963, 2 : 374.

Diagnosis : Opaque above; head gently rounded at sides; granules of the pronotum closely packed; pronotum opaque, without a pointed anterior process; metasternal shield strongly punctured t the sides, almost smooth in the middle.

Size : 10.5-12.5 mm × 6-7 mm.

Material examined : 1 ex. Gombegallu (EG).

Distribution : Greater part of India.

65. *Onthophagus (Colobonthophagus) hindu* Arrow

Onthophagus hindu Arrow, 1931, Fauna Brit. India (Coleoptera : Lamellicornia), III : 289; Balthasar, 1963, 2 : 381.

Diagnosis : Upper surface smooth; pronotum black, finely and fairly closely punctured; elytra lightly striate, suture with a minute elevation near the base.

Size : 8.5-11 mm × 5-6 mm.

Material examined : 5 exs. (Budipadaga, S).

Distribution : Greater parts of India.

66. *Onthophagus* (s. str.) *kchatriya* Bouc.

Onthophagus kchatriya Boucomont, 1914, Ann. Mus. Civ. Genova, XLVI : 233; Arrow, 1931 : 252, 255; Balthasar, 1963, 2 : 401.

Diagnosis : Shining black with head metallic green and pronotum deep blue or green; front angles of the pronotum blunt; each elytron decorated with five bright yellow patches; pygidium clothed with long hairs.

Size : 5.5-7 mm × 3.5-4 mm.

Material examined : 1 ex. (Budipadaga, S).

Distribution : South India (Tamil Nadu, Kerala, Karnataka)

67. *Onthophagus* (s. str.) *laevigatus* (F.)

Copris laevigatus. Fabricius, 1798, Ent. Syst. Suppl., : 35; Boucomont 1944a : 237; Arrow, 1931 : 279, 284; Balthasar, 1963, 2 : 411.

Onthophagus laevigatus Bouc., Ann. Mus. Civ. Genova, xlvi, 1914 : 237.

Diagnosis : Upper surface smooth and entirely dark; pronotum very finely, unevenly and sparsely punctured; front angles of the thorax not produced; pygidium opaque and bears very few minute punctures.

Size : 6-9 mm × 4-5 mm.

Material examined : 3 exs. (Budipadaga, S).

Distribution : S. India.

Elsewhere : Sri Lanka.

68. *Onthophagus* (s. str.) *ludio* Bouc.

Onthophagus ludio Boucomont, 1914, Ann. Mus. Civ. Genova, XLVI : 218; Arrow, 1931 : 328, 346; Balthasar, 1963, 2 : 422.

Diagnosis : Pronotum unequally and unevenly punctured; elytra with black band behind the middle; pygidium with a basal ridge, entirely dark.

Size : 4-6 mm × 3.3.5 mm.

Material examined : 1 ex. Gombegallu (EG)

Distribution : Peninsular India.

Elsewhere : Sri Lanka.

69. *Onthophagus (s. str.) madoqua* Arrow

Onthophagus madoqua Arrow, 1931, *Fauna Brit. India (Coleoptera : Lamellicornia)*, III : 258-259; Balthasar, 1963, 2 : 426.

Diagnosis : Pygidium clothed with long hairs; each elytron decorated with two red patches.

Size : 4-5 mm × 3 mm.

Material examined : 1 ex. (Budipadaga, S); 8 exs. (Purani, DD); 41 exs. (Kanneri, MD); 22 exs. Gombegallu (EG).

Distribution : S. India (Nilagiri Hills).

70. *Onthophagus (s. str.) mauritii* Bouc.

Onthophagus mauritii Boucomont, 1919 (1920), *Ann. Soc. Ent. France*, : 311; Arrow, 1931 : 263, 267; Balthasar, 1963, 2 : 434.

Diagnosis : Entirely black; elytra deeply striate; pronotum very convex and evenly punctured.

Size : 6-7 mm × 4-4.5 mm.

Material examined : 3 exs. (Budipadaga, S).

Distribution : Greater part of India.

71. *Onthophagus (s. str.) mopsus* (F.)

Scarabaeus mopsus Fabricius, 1792, *Ent. Syst.*, I : 58; Arrow, 1931: 327, 328; Balthasar, 1963, 2 : 441.

Copris mopsus Fabricius, 1801, *Syst. Eleut.*, I : 49.

Copris gracilicornis Germar, 1813, *Germar's Mag. Ent.*, I : 114.

Onthophagus gracilicornis Boucomont, 1914, *Ann. Mus. Civ. Genova*, XLVI : 220.

Diagnosis : Prenotum evenly, closely and finely punctured; without a basal impression on its sides; pygidium with a basal ridge.

Size : 6-8 mm × 4-5 mm.

Material examined : 12 exs. (Honnametty, Shola), 1 ex. (Gummane, Shola).

Distribution : North and East India.

Elsewhere : Pakistan (Karachi).

Remark : This is a new report to S. India.

72. *Onthophagus (Proagoderus) pactolus* (F.)

Scarabaeus pactolus Fabricius, 1787, *Mant. Ins.*, I : 12 : Olivier, 1789, *Ent.*, I, 3 : 119, pl. 16, Fig. 144; Harold, 1867, *Col. Hefte*, II : 39; Boucomont, 1914 : 262; *Proagoderus pactolus* Marcus, 1917 (1919), *Arch. f. Nai*, Ixxxiii, A. 10 : 65; Arrow, 1931 : 203; Balthasar, 1963, 2 : 466.

Diagnosis : Clypeal margin entire and feebly reflexed; head, pronotum and elytra densely punctured, base of pronotum strongly produced in the middle; pygidium is densely punctured and closely hairy at the base.

Size : 11-16 mm × 7-10 mm.

Material examined : 1ex. (Purani, DD).

Distribution : India.

73. *Onthophagus (s. str.) politus* (F.)

Copris politus Fabricius, 1798, *Ent. Syst., Suppl.*, : 35; *Onthophagus politus* Boucomont, 1944a : 217; Arrow, 1931 : 280, 309; Balthasar, 1963, 2 : 480.

Diagnosis : Clypeus feebly and bluntly bilobed; Elytra yellow with an irregular transverse black band in the middle, striae very finely punctured.

Size : 3-3.5 mm × 2-2.5 mm.

Material examined : 1 ex. (Budipadaga, S); 8 exs. (Purani, DD); 41 exs. (Kanneri, MD); 22exs. Gombegallu (EG).

Distribution : Greater part of India.

Elsewhere : Sri Lanka.

74. *Onthophagus pusillus* (F.)

Copris pusillus Fabricius, 1798, *Ent. Syst. Suppl.*, : 36; *Onthophagus pusillus* Boucomont, 1914, *Ann. Mus. Civ. Genova*, XLVI : 216; Arrow, 1931 : 321; Balthasar, 1963, 2 : 491.

Onthophagus myrmidon Jekel, 1872, *Rev. Mag. Zool.*, : 415.

Diagnosis : Pronotum closely punctured; clypeus truncate or excised in front; head granular; pygidium without a basal ridge.

Size : 3.5-4.5 mm × 2.5-3 mm.

Material examined : 252 exs. (Budipadaga, S).

Distribution : Sri Lanka.

Remarks : New record from India.

75. *Onthophagus (s. str.) quadridentatus* (F.)

Copris quadridentatus Fabricius, 1798, Ent. Syst. Suppl., : 34 : Arrow, 1931 : 279, 282; Boucomont, 1914 : 305; *Onthophagus quadridentatus* Boucomont, 1914a, Ann. Mus. Civ. Genova, XLVI : 229.

Copris quadricornis Fabricius, 1801, Syst. Eleuth., I : 54.

Onthophagus maerens Walker, 1858, Ann. Mag. Nat. Hist., (3) II : 209; Boucomont 1914 l. c.

Diagnosis : Upper surface smooth black and shining; pronotum finely and sparsely punctured; elytral suture without a minute elevation near the base;

Size : 6-8 mm × 4-5 mm.

Material examined : 2 exs. (Budipadaga, S).

Distribution : India.

Elsewhere : Sri Lanka.

76. *Onthophagus (s. str.) ramosus* (Wied.)

Copris ramosa Wiedeman, 1823, Zool. Mag. II, 1 : 13; Arrow, 1931 : 229, 236; Balthasar, 1963, 2 : 497.

Diagnosis : Upper surface smooth, opaque and very dark; pronotum moderately closely punctured, front angles not very acute, pygidium opaque and rather finely punctured; both sexes horned.

Size : 8-11.5 mm × 5.5-6.5 mm.

Material examined : 31 exs. (Budipadaga, S); 64 exs. (Purani, DD);

Distribution : Greater parts of India.

77. *Onthophagus (s. str.) rana* Arrow

Onthophagus rana Arrow, Fauna Brit. India (Coleoptera : Lamellicornia), III, 1931 : 268-269; Balthasar, 1963, 2 : 498.

Diagnosis : Upper surface without hairs or setae; pronotum unevenly punctured, not very convex; 7th elytral stria straight and parallel with the 6th.

Size : 6-8 mm × 4-5 mm.

Material examined : 2exs. (Honnametti, Shola).

Distribution : S. India.

78. *Onthophagus (Serrophorus) rectecornutus* Lansb.

Onthophagus rectecornutus Lansberge, 1883, Notes Leyd. Mus., V : 49 (ê); Arrow, 1907, Ann. Mag. Nat. Hist., (7) XIX : 421 (ê); Boucomont, 1914a : 228; Boucomont et Gillet, 1921 : 55; Arrow, 1931 : 229, 233; Balthasar, 1935d : 342; Palian, 1945 : 90, 119; Balthasar, 1963, 2 : 498.

Onthophagus luridus Paulian, 1933, Bull. Soc. Zool. France, LVII : 98; Paulian, 1945 : 119.

Diagnosis : Upper surface smooth; pronotum not shining, light brown with black punctures; elytra pale, opaque.

Size : 7-10 mm × 5-6 mm.

Material examined : 44 exs. (Budipadaga, S); 182 exs. (Purani, DD); 697 exs. (Kanneri, MD); 95 exs. Gombegallu (EG); 594 exs. (Honnametti, Shola); 90 exs. (Gummane, Shola).

Distribution : India.

Elsewhere : Myanmar, Sri Lanka, Bhutan.

79. *Onthophagus (s. str.) semicinctus* d'Orb.

Onthophagus semicinctus d'Orbigny, 1897, Ann. Soc. Ent. France, LXIV : 242; L'Abeille, (d'Orbigny) 1898, XXIX: 215; Arrow, 1931 : Fauna Brit. India, (Coleoptera : Lamellicornia) : 294-295; Balthasar, 1963, 2 : 518.

Onthophagus bufo Arrow, 1907, Ann. Mag. Nat. Hist. (7) XIX : 420; Arrow, 1931, l.c.

Diagnosis : Entirely black and smooth, pronotum, unequally, unevenly and well punctured, not shining; elytra not deeply striate, suture without a minute elevation near the base, intervals sparsely granulate.

Size : 6-8.5 mm × 4-5 mm.

Material examined : 14 exs. (Budipadaga, Scrub).

Distribution : Greater parts of India.

Elsewhere : Pakistan

80. *Onthophagus (s. str.) tarandus* (F.)

Scarabaeus tarandus Fabricius, 1792, Ent. Syst., I : 48; Arrow, 1931 : 180; Balthasar, 1963, 2 : 548.

Onthophagus suturatus Germar, 1821, Ins. Spec. Nov., 1 : 105; Harold, 1869, Cat. Col. IV : 1037.

Onthophagus biexcavatus d'Orbigny, 1898, l'Abeille, XXIX : 204; Boucomont, 1914, Ann. Mus. Civ. Genova, XLVI : 235.

Diagnosis : Coppery, pronotum and elytra opaque, densely rugulose and clothed with fine close recumbent hairs; ; vertex is produce outward on each side into a sharp pointed process; pronotum bears a deep round excavation at the anterior border, which is produced in the middle as a bidid horizontal process in front.

Size : 6.5-9 mm × 4-5 mm.

Material examined : 66 exs. (Budipadaga, S); 9 exs. (Purani, DD); 11 exs. (Kanneri, MD).

Distribution : India.

81. *Onthophagus (s. str.) transcaspicus* Koenig

Onthophagus transcaspicus Koenig, 1889, *Horae Ent. Soc. Ross.*, XXIII : 302; Reitter, 1904, *Wien. Ent. Zeit.*, XXIII : 25; d'Orbigny, 1913, *Ann. Soc. Ent. France*, LXXXII: 132; Arrow, 1931 : 280, 307; Balthasar, 1963, 2 : 558.

Onthophagus lineatus Reitter, 1888, *Verh. Nat. Ver. Brunn.*, XVII : 102; d'Orbigny, 1898 : 216; d'Orbigny, 1900 : 299; Reitter, 1904, l.c.

Onthophagus sticticus var. *obsoletus* Fairmaire, 1875, *Ann. Mus. Civ. Genova*, VII : 487.

Onthophagus gazella Heyden (nec Fabricius), 1913, *Novit. Zool.*, XX : 106.

Diagnosis : Dark chocolate brown or black; clypeal margin strongly reflexed and very feebly emarginated in the middle; elytral intervals with scattered granules.

Size : 8-9.5 mm × 4-5 mm.

Material examined : 2 exs. (Budipadaga, S); 2 exs. (Purani, DD); 1ex. (Kanneri, MD); 1 ex. Gombegallu (EG).

Distribution : Wasiristan, Turkistan, Arabia, Algeria, Somalikand.

Remark : New report to India.

82. *Onthophagus (Parascatonomus) tricornis* (Wied)

Copris tricornis Wiederman, 1823, *Zool. Mag.*, II, 1 : 10; Boucomont et Gillet, 1921 : 42; Arrow, 1931 : 184, 198; Balthasar, 1935d : 328; Paulian, 1945 : 88, 104; Balthasar, 1963, 2 : 560.

Onthophagus crassus Sharp. 1875, Col. HefteXIV : 51; Lansberge, 1883, *Not. Leyden Mus.*, V : 44.

Onthophagus rectinicornis Fairmaire, 1878, *Ann. Soc. Ent. France* (5), VIII : 96, Tf. 4, Fig. 6; Lansberge, l. c.

Diagnosis : Black, oval and very convex; front margin of the clypeus produced in the middle into a short reflexed process; Pronotum with a pointed anterior process, covered with closely packed granules.

Size : 12-17.5 mm × 8-10 mm.

Material examined : 1 ex. (Gummane, Shola).

Distribution : NE India (Bihar).

Elsewhere : Myanmar, Cambodia, C. China, Java.

Remark : New record from South India.

83. *Onthophagus (s. str.) tritinctus* Bouc

Onthophagus tritinctus Boucomont, 1914, *Ann. Mus. Civ. Genova*, XLVI : 217; Arrow, 1931 : 263, 266; Balthasar 1935d : 338; Palian, 1945 : 89, 127; Balthasar, 1963, 2 : 564.

Diagnosis : Vertex bearing two tubercles; 7th elytral stria straight and parallel with the 6th.

Size : 4 mm × 2.5 mm.

Material examined : 1ex. (Gummane, Shola)

Distribution : Peninsular India.

Elsewhere : Sri Lanka.

84. *Onthophagus (s. str.) truncaticornis* (Schall.)

Scarabaeus truncaticornis Schaller, 1783, Abh. Hall. Nat. Ges., I : 238; Harold, 1870, Col. Hefte, VI : 105; Harold, 1880, Mill. Munch. Ent. Ver., IV : 151; Arrow, 1931 : 321, 322; Balthasar, 1963, 2 : 568.

Onthophagus forcipatus Harold, 1873, Col. Hefte, XI : 103; Arrow, 1931 : 322.

Diagnosis : Greenish black and broadly oval insects; clypeus excised in front; pygidium without a basal ridge.

Size : 6.5-8 mm × 4 mm.

Material examined : 5 exs. (Budipadaga, S); 2 exs. (Purani, DD).

Distribution : S. India.

85. *Onthophagus (s. str.) turbatus* Walk.

Onthophagus turbatus Walker, 1858, Ann. Mag. Nat. Hist., (3) II : 209; Boucomont et Gillet, 1921 : 54; Arrow, 1931 : 327, 329; Balthasar, 1963, 2 : 569.

Diagnosis : Pronotum evenly, finely and closely punctured; pronotum with a faint oblique basal impression on each side and with an anterior prominence.

Size : 7-8 mm × 4.5 mm.

Material examined : 224 exs. (Budipadaga, S); 116 exs. (Purani, DD); 58 exs. (Kanneri, MD); 1 ex. Gombegallu (EG).

Distribution : S. India.

Elsewhere : Sri Lanka

86. *Onthophagus (Paraphanacomorphus) comottoi* Lansb.

Onthophagus comottoi Lansberge, 1885, Ann. Mus. Civ. Genova, XXII : 382; Boucomont et Gillet, 1921 : 49; Arrow, 1931 : 314; Balthasar, 1963, 2 : 315.

Diagnosis : Pronotum with a sharp median tubercle; elytra with median black band and median and apical spots;

Size : 5.5 mm × 3.5-4.5 mm.

Distribution : Myanmar.

Elsewhere : New report to India.

Genus *Phacosoma* Bouc.

Phacosoma Bouc., *Ann. Soc. Ent. France*, lxxxiii, 1914 : 249.

Type : *P. dytiscoides* Bouc. (Borneo, Singapore).

Range : Indo-Malayan region.

Diagnosis : Body rather depressed, lateral margins of the elytra rather sharp

87. *Phacosoma laetum* Arrow

Diagnosis : *Phacosoma laetum* Arrow, *Fauna Brit. India* (Coleoptera : Lamellicornia) : 356.

Size : 4.5-5 mm × 3 mm.

Distribution : S. India.

Genus *Phalops* Er.

Phalops Erichson, 1848, *Nat. Ins. Deutschl.*, III : 764; Lacordaire, 1856, *Gen. Col.* III : 109; Lansberge, 1883, *Stett. Ent. Zeit.* XLIV : 162; d'Orbigny, 1898 : 299; Péringuey, 1900 : 266; d' Orbigny, 1902 : 212; d' Orbigny, 1913 : 172; Arrow, 1931 : 134; Balthasar, 1963, 2 : 604.

Ephillopus Reitter, 1893, *Bestimmungstab. Coproph. Lamell.*, : 47.

Type : *Copris divisa* Wied.

Range : Africa, SW Asia, India.

88. *Phalops divisus* (Wied.)

Copris divisus Wiedemann, 1823, *Zool. Mag.*, II, I : 12; *Phalops divisus* Lansberge, 1883 : 161, 169; d'Orbigny, 1898 : 221; Arrow, 1931 : 134, 135; Balthasar, 1963, 2 : 609.

Size : 9-13 mm × 5-7.5 mm.

Distribution : India.

Elsewhere : Sri Lanka.

Note : Apart from these 87 species, another 2 species of *Copris* and 16 species of *Onthophagus* were also collected from BRT WLS which I could not put into any of the known species. Detailed taxonomic studies of these specimens are in progress and will be published separately later after verifying with other museum specimens and literature.

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REFERENCES

- BALTHASAR, V. 1963. *Monographic der Scarabaeidae und Aphodiidae der palaearktischen und Orientalischen Region (Coleoptera : Lamellicornia)*, Band, 1 : 1-391 & pl I-XXIV 1-627 + I-XVI. (Czechoslovak Academy of Sciences Prague).
- BALTHASAR, V. 1963. *Monographic der Scarabaeidae und Aphodiidae der palaearktischen und Orientalischen Region (Coleoptera : Lamellicornia)*, Band, 2 : 1-627 & pl I-XVI. (Czechoslovak Academy of Sciences Prague).
- DAVIS, A.J. and S.L. SUTTON. 1998. The effect of rain forest canopy loss on arboreal dung beetles in Borneo: implications for the measurement of biodiversity in derived tropical ecosystems. *Diversity and Distributions*, 4 : 167-173.
- HANSKI, I. and CAMBEFORT, 1991. Dung beetle ecology. Princeton University Press, Princeton : 1-481.
- HALFFTER, G. and W.D. EDMONDS. 1982. The nesting behaviour of dung beetles (Scarabaeinae) : an ecological and evolutive approach. *Publicaciones del Instituto de Ecología*, Mexico City : 1-175.
- HALFFTER, G. and E.G. MATTHEWS. 1966. The natural history of dung beetles of the subfamily Scarabaeinae (Col. : Scarabaeidae). *Folia Entomol. Mex.*, 12-14 : 1-312.
- HILL, C.J. 1996. Habitat specificity and food preferences of an assemblage of tropical Australian dung beetles. *Journal of Tropical Ecology*, 12 : 449-460.
- JANZEN, D.H. 1983. Insects at carrion and dung. Costa Rican Natural History (ed. D.H. Janzen) : 640-642. University of Chicago Press, Chicago, IL.
- VULINEC KEVINA, 2000. Dung beetles (Coleoptera : Scarabaeidae), Monkeys and conservation in Amazonia, *Florida Entomologist*, 83(3) : 229-241.

INSECTA : DIPTERA : TEPHRITIDAE

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INTRODUCTION

Tephritidae (Diptera : Insecta), commonly known as fruit flies, are small to medium sized flies distributed throughout the temperate, subtropical and tropical parts of the world. However, predominance of species is found in the tropics and subtropics. Barring very few species, almost all the fruit flies of which biology is known, have phytophagous larval stages. The larvae complete their development while feeding in developing ovaries of fruits and seeds or while mining leaf, stem or root tissues and also forming galls in host plants. Many species of fruit flies are host specific. About 4000 species arranged in 500 genera are included in the family Tephritidae of which about 840 species are known from the Oriental Region. So far, 203 species belonging to 77 genera, 11 tribes and 3 subfamilies are known from India (Kapoor, 1993; Radhakrishnan, 1993, 1998, 1999, 2000).

Among the Diptera collected from the Biligiri Rangaswamy Temple (BRT) Wildlife Sanctuary, sent to the author for identification, only 3 species of Tephritidae were available. They belonged to 3 genera under 1 subfamily as listed and discussed below.

SYSTEMATIC LIST

Order DIPTERA

Family TEPHRITIDAE

Subfamily TEPHRITINAE

Tribe Tephritini

1. *Dioxyna sororcula* (Wiedemann)
2. *Spathulina acroleuca* (Schiner)
3. *Procecidochares utilis* Stone

SYSTEMATIC ACCOUNT

1. *Dioxyna sororcula* (Wiedemann)

1830. *Trypeta sororcula* Wiedemann, Aussereur. Zweift. Ins., 2 : 509. Type-locality : Teneriffe.

1954. *Dioxyna sororcula* : Frey, Commental. Biol., 8 : 62.

Material examined : 1 ex., K. Gudi, 8-iv-2000, Coll. S. Krishnan.

Diagnosis : This small species is characterized by having only 2 scutellar bristles and the head longer than high, longest on the lower margin, with the epistoma and sides of the face protruded, body black in ground colour, very densely yellow-gray tomentose and covered with white scale-like setae. Wings characteristically marked as in Fig.1.

Length : Body and wings, 2.5–3.0 mm.

Distribution : Most widespread species in the Old World which has an unbroken range from the Mediterranean through Africa and tropical Asia to Australia, and is adventive in the Hawaiian Islands.

Habits and habitats : This species is a seed infester, living in the flowerheads (capitulum) of members of the plant family Asteraceae.

Status : Very common. The species is a pest of Niger seed (*Guizotia abyssinica*) in India (Jakhmola, 1983).

2. *Spathulina acroleuca* (Schiner)

1868. *Tephritis acroleuca* Schiner, Reise Novara, Dipt., : 268. Type-locality : Sydney, Australia.

1927. *Spathulina acroleuca*: Hendel, in Lindner Die Fliegen palaearkt. Reg., 49 : 1-221.

Material examined : 1 ex., Seebinakere, 7-iv-2000, Coll. S. Krishnan.

Diagnosis : This is a small, dark-coloured species with largely dark brown to black wings, containing hyaline spots along margin, with the apical portion of wing completely hyaline or with just a tiny dark brown spot at extreme apex of cell R₃ and with only 2 or 3 isolated hyaline spots in wing field (Fig. 2). Length: Body and wings, 3.0–3.5 mm.

Distribution : Found in most tropical areas of the Old World.

Habits and habitats : Breeds in the flower heads of various Asteraceae.

Status : Very common.

3. *Procecidochares utilis* Stone

1947. *Procecidochares utilis* Stone, Proc. Hawaiian Entomol. Soc., 13 : 97-98. Type-locality : Mexico, Morelos, Cuernavaca.

Material examined : 1 ex., Seebinakere, 7-iv-2000, Coll. S. Krishnan.

Diagnosis : This species is larger than the above two species in size and can be separated from the above two by its shining scutum and scutellum, and its hyaline wing bearing distinct brown oblique bands.

Distribution : This species is a strictly New World genus being a native of central America. It has been introduced in India in 1963 for the control of Crofton weed; though became sufficiently well established, it has not been an effective agent of weed control in India.

Habits and habitats : Breeds in the Crofton weed inducing stem galls.

Status : Fairly common in hilly areas where the Crofton weed grows.

REFERENCES

- JAKHMOLA, S. S. 1983. Niger grain fly, *Dioxyna sororcula* (Wiedemann), a serious pest of niger in central India. *J. Bombay nat. Hist. Soc.*, **80** : 439-440.
- KAPOOR, V. C. 1993. *Indian fruit flies (Insecta : Diptera : Tephritidae)*; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi : 228.
- RADHAKRISHNAN, C. 1993. New record of *Dietheria fascicata* Hardy (Tephritidae : Diptera : Insecta) from India and its biogeographical affinities. *Hexapoda*, **5**(1) : 67-70.
- RADHAKRISHNAN, C. 1998. Tephritidae (Diptera), 304-310. In : *Faunal diversity in India*, ENVIS Centre, Zoological Survey of India, Calcutta, : 497.
- RADHAKRISHNAN, C. 1999. A new species of *Bactrocera* Macquart (Diptera : Tephritidae : Dacinae) from Southern India. *Rec. zool. Surv. India*, **97**(4) : 1-4.
- RADHAKRISHNAN, C. 2000. *Ichneumonopsis burmensis* Hardy (Tephritidae : Diptera : Insecta) a new record from India. *Rec. zool. Surv. India*, **98**(1) : 203-204.

INSECTA : LEPIDOPTERA : RHOPALOCERA

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INTRODUCTION

The butterfly fauna, their species diversity and dispersal patterns in a geographical region or territory tend to reflect the heterogeneity of their habitat environs. Thus, butterflies have a great potential for inclusion in the faunal analysis and environmental monitoring as well as in local scale environmental planning. Accordingly, the importance of butterflies as 'ecological indicators' enabling us to make the interpretative assessment/analysis on habitat changes or modifications is increasingly being realised nowadays. Inventorying and monitoring of the species diversity and richness of butterflies in a habitat area of conservational significance is, therefore, having considerable relevance and importance.

There are more than 17,200 species of butterflies (Insecta : Lepidoptera : Rhopalocera) known to Science. 1501 species are represented in India. Of these, 340 species are known to occur in Peninsular India (Kunte, 2000). A small collection of butterflies gathered from the Biligiri Rangaswamy Temple (B.R.T.) Wildlife Sanctuary made available to the authors for study comprised of 20 species belonging to 14 genera and 3 families as detailed below. However, considering the diversity of butterflies known so far from Southern India, obviously there is scope to explore further, the butterfly fauna of the sanctuary.

The diagnostic characters of the species studied and presented in this account are based on Wynter-Blyth (1957) and Satyamurti (1966). The specimens are deposited in the faunal depository of the Southern Regional Station, Zoological Survey of India, Chennai.

SYSTEMATIC LIST

Order LEPIDOPTERA

Suborder RHOPALOCERA

Family PAPILIONIDAE

1. *Pachliopta hector* (Linnaeus)
2. *Pachliopta aristolochiae* (Fabricius)

3. *Papilio polymnestor* Cramer
4. *Papilio paris* Linnaeus
5. *Papilio polytes* Linnaeus

Family PIERIDAE

6. *Eurema hecabe* (Linnaeus)
7. *Eurema blanda* (Boisduval)

Family NYMPHALIDAE

8. *Tirumala septentrionis* (Butler)
9. *Tirumala limniace* (Cramer)
10. *Danaus chrysippus* (Linnaeus)
11. *Euploea core* (Cramer)
12. *Neptis hylas* Moore
13. *Cupha erymanthis* (Drury)
14. *Precis iphita* (Cramer)
15. *Junonia lemonias* (Linnaeus)
16. *Junonia hirta* (Fabricius)
17. *Byblia ilithyia* (Drury)
18. *Lethe europa* (Fabricius)
19. *Cyrestis thyodamas* Boisduval
20. *Libythea lepita* Moore

SYSTEMATIC ACCOUNT

**1. *Pachliopta hector* (Linnaeus)
Crimson Rose**

1758. *Papilio hector* Linnaeus. *Syst. Nat.*, ed. 10 : 459.
 1983. *Atrophaneura (Atrophaneura) hector* : Hancock, *Smithersia*, 2 : 47.
 1993. *Pachliopta hector* Linnaeus. Varshney : Index Rhopalocera Indica. *Oriental Insects*, 27 : 354.

Diagnosis : Wings black; hind wings tailed and with discal and marginal rows of posteriorly strongly curved series of seven crimson spots followed by a sub marginal series of crimson lunules. Wingspan : 90–110 mm.

Material examined : 1ex., Hannakere, 27-ii-1999, Coll. S. Krishnan.

Distribution : India (Bengal, S. Bihar, Orissa, S. India).

Habits and Habitats : Found both in jungle and open country visiting flowers, especially *Lantana*.

Status : Extremely common in the southern part of the Indian Peninsula.

2. *Pachliopta aristolochiae* (Fabricius)
Common Rose

1775. *Papilio aristolochiae* Fabricius. *Syst. Ent.*, : 443.

1983. *Atrophaneura (Atrophaneura) aristolochiae* : Hancock, *Smithersia*, 2 : 47.

1993. *Papilio aristolochiae* Fabricius: Varshney, Index Rhopalocera Indica. *Oriental Insects*, 27 : 354.

Diagnosis : Hind wing tailed and with five elongated white spots. A series of crimson spots present on the outer margin of the hind wings. Wingspan : 80–110 mm.

Material examined : 1ex., Kenkere, 25-ii-1999, Coll. S. Krishnan.

Distribution : Throughout the Oriental Region.

Habits and habitats : Found in low elevation areas and in gardens all over the plains especially during and after the monsoon.

Status : Very common.

3. *Papilio polymnestor* Cramer
Blue Mormon

1775. *Papilio polymnestor* Cramer. *Pap. Exot.*, 1 : 83. Pl. 53. Fig. A, B.

1983. *Princeps (Menelaides) polymnestor* : Hancock. *Smithersia*, 2 : 48.

1993. *Pailio polymnestor* Cramer : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 27 : 352.

Diagnosis : Upper side of fore wing black, with a pale blue discal band which narrows down and becomes obsolete towards the apex. On the upper side of the hind wing, the basal quarter is black and the remaining distal three quarters pale blue with a row of black discal spots. Underside of the hind wing with five irregular small patches of red at the base. Wingspan : 120–150 mm.

Material examined : 1ex., Gombakalpodu, 9-iv-2000, Coll. S. Krishnan.

Distribution : India (S. India, Madhya Pradesh, S. Bihar, Bengal, Western Ghats, Sikkim).

Elsewhere : Sri Lanka.

Habits and habitats : Found generally in evergreen jungles, at times also visiting the plains.

Status : Not rare.

**4. *Papilio paris* Linnaeus
Paris Peacock**

1957. *Papilio paris* Linnaeus : Wynter Blyth. *Butterflies of Indian Region*, : 388.

1993. *Papilio paris* Linnaeus : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 27 : 352.

Diagnosis : Upper side of wings black, dusted with green. Upper side of the hind wing with a large, bright green or blue, sharply defined patch. Wingspan : 90–140 mm.

Material examined : 1ex., Gombakalpodu, 9-iv-2000, Coll. S. Krishnan.

Distribution : India (S. India-Western Ghats, Orissa, Kumaon to Sikkim).

Elsewhere : Myanmar.

Habits and habitats : Usually confined to the evergreen regions, this butterfly can be seen in clearings and along forest paths as well as circulating round tops of trees. Very rarely, the species can be found singly in the plains.

Status : Not rare.

**5. *Papilio polytes* Linnaeus; form : cyrus
Common Mormon**

1775. *Papilio romulus* Cramer, *Pap. Exot.*, 1 : 67. Pl. 43, fig. A.

1983. *Princeps (Melanides) polytes*: Hancock, *Smithersia*, 2 : 48.

1993. *Papilio polytes* Linnaeus : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 27 : 352.

Diagnosis : Wings of male black with an elongated series of white spots along the central region of the hind wing. The forewing has a terminal series of smaller white spots (the form **cyrus** represented in the collection resemble the male in colouration with some indistinct red spots on the hind wing). Wingspan : 90-100mm.

Material examined : 1ex., BRT Hills, 29-ii-2000, Coll. G. Thirumalai.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : Though this butterfly prefers lightly wooded country, it can be met with throughout the year over most of the plains of India and also in the hills up to a considerable height.

Status : Very common.

**6. *Eurema hecabe* (Linnaeus)
Common Grass Yellow**

1886. *Terias contubernalis* Moore, *Journ. Linn. Soc. Lond. Zool.*, 21 : 46.

1939. *Eurema hecabe* Linnaeus : Talbot. *Fauna Brit. India, Butterflies*, 1 : 527-530.

Diagnosis : Upper side of wings lemon yellow with black borders. Underside of fore wing with two minute black spots in the cell.

Material examined : 1ex., Dodd Sampige, 2-iii-2000, Coll. G. Thirumalai; 2exs., Sabinakere, 4-iv-1999. Coll. Thirumalai; 1ex. , Kadakkinkand, 21-ii-99, Coll. S. Krishnan; 1ex., Bhanuwadi. 19-ii-1999, Coll. S. Krishnan; 1ex., BRT Hills, 29-ii-2000, Coll. G. Thirumalai; 1ex., Dorasamallakhudi, 7-iv-2000, Coll. S. Krishnan.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : Having a wide range of food plants, this species is the commonest of the genus and can be found in most of its ranges in grassy places throughout the year.

Status : Very common.

7. *Eurema blanda* (Boisduval) Three-spot Grass Yellow

1867. *Terias silhetana* : Wallace, *Trans. Ent. Soc. Lond.*, 4 (Ser. 3); Pt. III, : 324.

1939. *Eurema blanda* : Talbot, *Fauna Brit. India. Butterflies*, 1 : 523-525.

1993. *Eurema blanda* Boisduval : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 27 : 364.

Diagnosis : Upper side of wings bright yellow. Underside of the fore wing with three minute black spots in the cell.

Material examined : 1ex., Kadakkinkand, 21-ii-1999. Coll. S. Krishnan; 1ex., BRT Hills, 29-ii-2000. Coll. G. Thirumalai.

Distribution : Throughout India,

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : Usually a butterfly of low altitudes that can be found flying among stems of grass and low bushes and at times even flying higher.

Status : Common.

8. *Tirumala septentrionis* (Butler) Dark Blue Tiger

1874. *Danais septentrionis* Butler, *Ent. Mo. Mag.*, 11 : 163.

1984. *Tirumala septentrionis* : Ackery & Vane-Wright, *Milkweed Butterflies*, : 199.

Diagnosis : Upper side of wings black with pale blue streaks and marginal spots. The

markings are narrow and dark. Hind wing with a characteristic wishbone marking in the cell, formed by two white streaks joined at the base. Wingspan : 80–105 mm.

Material examined : 2exs., Kankere, 25-ii-1999, Coll. S. Krishnan; 1ex., Basavanolidu, 3-iv-1999. Coll. Thirumalai; 1ex., Gombakalpodu, 9-iv-2000, Coll. S. Krishnan; 1ex., Dorasanialla, 7-iv-2000, Coll. S. Krishnan.

Distribution : Throughout the Oriental Region.

Elsewhere : Australia, New Guinea and the Pacific Islands.

Habits and habitats : A butterfly of forested hilly regions of South India. A weak flier and a known migrant appearing in large swarms during winter and summer.

Status : Common.

9. *Tirumala limniace* (Cramer) Blue Tiger

1866. *Danais limniace* : Butler. *Proc. Zool. Soc. Lond.*, : 52.

1984. *Tirumala limniace* : Ackery & Vane-Wright, *Milkweed Butterflies*, : 198.

Diagnosis : Similar to the Dark Blue Tiger (*Tirumala septentrionis*) but with broader and paler streaks and spots on the wings. Wingspan : 90-100mm.

Material examined : 2exs., Road to Sabinakere, 4-iv-1999, Coll. G. Thirumalai; 1ex., Sabinakare, 4-iv-1999, Coll. G. Thirumalai.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : This butterfly can be found throughout the plains and hills of India. It is an inhabitant of lightly wooded country.

Status : Very common.

10. *Danaus chrysippus* (Linnaeus) Plain Tiger

1758. *Papilio chrysippus* Linnaeus. *Syst. Nat. ed. 10* : 471.

1984. *Danaus chrysippus* : Ackery & Vane-Wright, *Milkweed Butterflies*, : 209.

Diagnosis : The upper side of wings tawny red. The costa and apex are black. The apical dark area is crossed by a white oblique bar, with one inner and two sub-terminal white spots below its lower end. Two or three small white spots are present at the apical margin. The hind wing has three small black spots on the border of the cell. Wingspan : 70-80 mm.

Material examined : 1ex., Kankere, 12-iv-2000, Coll. S. Krishnan; 1ex., K. Gudi, 1-iii-1999. Coll. S. Krishnan.

Distribution : Through India.

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : It is primarily a butterfly of open country and grasslands and found rarely in damp, forested, hilly regions.

Status : Very common.

11. *Euploea core* (Cramer)
Common Crow

1780. *Papilio core* Cramer, *Pap. Exot.*, 3 : 133, pl. 266., figs. E, F.

1984. *Euploea core* : Ackery & Vane-Wright, *Milkweed Butterflies*, : 228.

Diagnosis : The upper side of wings glossy, blackish brown becoming paler brown along the terminal margins. Both the wings bear a series of marginal and sub terminal white spots. The inner series especially on the hind wings, is composed of elongated spots and the outer series of circular spots. A white spot at the cell-end on the underside of the fore wings is prominent. Wingspan: 85-95mm.

Material examined : 1ex., Hanakere, 27-ii-1999, Coll. S. Krishnan; 1ex., Road to Sabinakere, 4-iv-1999. Coll. Thirumalai; 2exs., Gombakalpodu, 9-iv-2000, Coll. S. Krishnan; 1ex., Doddasampige, 2-iii-2000, Coll. G. Thirumalai.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : This butterfly can be found in all types of country, flying about shrubs or bushes.

Status : Very common.

12. *Neptis hylas* Moore
Common Sailer

1872. *Neptis astola* Moore, *Proc. Zool. Soc. Lond.* : 32

1905. *Neptis eurynome*, Bingham. *Fauna Brit. India. Butterflies*, 1 : 323.

1932. *Neptis hylas* : Evans. *The Identification of Indian Butterflies*, : 166.

Diagnosis : The upper side is black, with white markings. The fore wing bears a white streak, narrow behind and broad and truncated in front and a large triangular white spot beyond the apex of the cell. There is also a discal series of well-separated white spots and

a post-discal series of small white spots, but this series is incomplete. The hind wing bears a prominent, white, sub-basal band equally broad throughout, and a post-discal series of squarish white spots, well separated. The under side colouration is chestnut and with the white markings, sharply edged with black lines. Wingspan : 50-60mm.

Material examined : 1ex., Basavanagodu, 28-ii-1999, Coll. S. Krishnan; 1ex., Dorasanialla, 7-iv-2000, Coll. S. Krishnan; 1ex., Doddasampige, 2-iii-2000, Coll. G. Thirumalai.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : A species of damp, hilly regions. It is fond of sunlight and can be seen basking on leaves and rocks with its wings held wide open.

Status : Very common.

13. *Cupha erymanthis* (Drury) Southern Rustic

1957. *Cupha erymanthis* (Drury). Wynter-Blyth. *Butterflies of the Indian Region*, : 226.

1993. *Cupha erymanthis* Drury : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 28 : 172

Diagnosis : The upper side of wings dark brown. Fore wing broad and rounded. Fore wing with broad black apex and broad yellow or reddish yellow discal band. Hind wing with two lunular dark marginal lines and a row of small black discal spots. Wingspan: 50-60mm.

Material examined : 1ex., Doddasampige, 2-iii-2000, Coll. G. Thirumalai.

Distribution : India (S. India, Mussoorie to Assam).

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : Though an inhabitant of jungle in regions of heavy rainfall, this butterfly can be occasionally seen during and after rainy season in the plains.

Status : Common.

14. *Precis iphita* (Cramer) Chocolate Pansy

1779. *Papilio iphita* Cramer, Pap. Exot., 3 : Pl. 209. fig. c & d.

1905. *Junonia iphita*, Bingham, Fauna Brit. India. Butterflies, 1 : 356.

1932. *Precis iphita*, Evans, The Identification of Indian Butterflies, : 177.

Diagnosis : Upper side of wings chocolate brown, with obscure, transverse markings of a darker brown shade. Fore wing with one or two minute ocelli and hind wing with a row of five indistinct yellowish brown ocelli. Under side is dark brown with wavy lines and indistinct ocelli. Wingspan: 50-80 mm.

Material examined : 1ex., Road to Sabinakere, 4-iv-1999, Coll. G. Thirumalai; 1ex., Doddachempike, 25-ii-1999, Coll. S. Krishnan; 1ex., BRT Hills, 29-ii-2000, Coll. G. Thirumalai.

Distribution : India (South and Central India, Himalaya as far west as Kashmir, NE India).

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : More often found in shady places and sunning itself on the ground or on low leaves as well as settling on damp patches and wet roads; this species inhabits wet, well-wooded regions in the hills.

Status : Common.

15. *Junonia lemonias* (Linnaeus)
Lemon Pansy

1758. *Papilio lemonias* Linnaeus, *Syst. Nat.*, (ed. 10) : 473.

1905. *Junonia lemonias*, Bingham. *The Fauna of British India. Butterflies*, : 357.

1994. *Junonia lemonias* Linnaeus : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 28 : 176.

Diagnosis : Upper side of wings dark brown with black and lemon yellow spots. Large blue-centered, yellow-ringed black ocellus is present in both the wings. The underside is yellowish brown. Wingspan : 45-60 mm.

Material examined : 16exs., BRT Hills, 29-ii-2000, Coll. G. Thirumalai.

Distribution : India (Himalaya as far west as Kashmir, Assam, West Bengal, South and Central India, Saurashtra).

Elsewhere : Sri Lanka and Myanmar.

Habits and habitats : The species can be met with both at hills and on the plains flying in forest and open country

Status : Common.

16. *Junonia hirta* (Fabricius)
Yellow Pansy

1932. *Precis hirta* : Evans. *The Identification of Indian Butterflies*, : 176.

1994. *Junonia hirta* Fabricius : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 28 : 176.

Diagnosis : Upper side of wings bright yellow. The apex of the forewing is black with yellow and white spots. The hind wings have a large blue oval patch at the base. Under side is straw yellow. Wingspan : 45-60mm.

Material examined : 2exs., BRT Hills, 29-ii-2000, Coll. G. Thirumalai.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar.

Habits and habitats : Though a butterfly of low elevations and the plains, it can also be seen at hills but less in forests.

Status : Very common.

17. *Byblia ilithyia* (Drury)
Joker

1957. *Byblia ilithyia* (Drury). Winter-Blyth. *Butterflies of the Indian Region*, : 231.

1993. *Byblia ilithyia* Drury : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 28 : 172.

Diagnosis : The upper side of wings bright tawny orange, with narrow black markings. The under side is paler and with dull black spots and irregular patches. Wingspan : 45-55 mm.

Material examined : 1ex., Hanakere, 27-ii-1999. Coll. S. Krishnan.

Distribution : India (Peninsular India as far north as Madhya Pradesh, Mhow and Kutch).

Elsewhere : Sri Lanka.

Habits and habitats : Found around hedgerows, almost entirely confined to dry, open plains.

Status : Locally abundant.

18. *Lethe europa* (Fabricius)
Bamboo Tree Brown

1775. *Papilio europa* Fabricius. *Syst. Ent.*, (3)1 : 500

1939. *Lethe europa* : Talbot. *Fauna. Brit. India. Butterflies*, 2 : 197-198.

1994. *Lethe europa* Fabricius : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 28 : 172.

Diagnosis : The upper side of wings dark brown. On the forewing, there are two inconspicuous black ocelli followed by two distinct white spots, the upper one of these being double. The white discal bar of the underside shows through conspicuously. Terminal margins of both wings with pale white lines. The underside is blackish brown traversed

near base by a slender bluish white line. Under side of both wings with a post-discal series of black ocelli bordered by silvery purple lines on both sides. Wingspan : 65-75mm.

Material examined : 1ex., Kadakkanakandi, 21-ii-1999, Coll. S. Krishnan.

Distribution : India (South India, Madhya Pradesh, Dehradun to Assam).

Elsewhere : Myanmar.

Habits and habitats : Inhabits forest and jungle where bamboo grows.

Status : Rare in South and common in North India.

19. *Cyrestis thyodamas* Boisduval Common Map

1836. *Cyrestis thyodamas* Boisduval, *Cur. Reg. Anim. Ins.*, 2 : Pl. 138. fig. 4.

1932. *Cyrestis thyodamas* : Evans. *The Identification of Indian Butterflies*, : 173

Diagnosis : The upper side of wings white, with the veins black. The wings are with map like irregular markings. Wingspan : 50-60 mm.

Material examined : 1ex., BRT Hills, 29-ii-2000, Coll. G. Thirumalai.

Distribution : India (Himalaya as far west as Kashmir, Assam, southern part of Western Ghats, Palnis).

Elsewhere : Myanmar.

Habits and habitats : Found in the wetter, hilly jungle regions.

Status : Not rare.

20. *Libythea lepita* Moore Common Beak

1932. *Libythea lepita lepita* Moore. Evans : *The identification of Indian Butterflies*, : 194.

1994. *Libythea lepita* Moore : Varshney, Index Rhopalocera Indica. *Oriental Insects*, 28 : 191.

Diagnosis : Upper side of wings dark brown. Forewings much produced and truncate at apex. Fore wing with a tawny band from the base of cell and with a spot beyond the end cell, separated from the cell streak. Wingspan : 45-50 mm.

Material examined : 13exs., BRT Hills, 29-ii-2000, Coll. G. Thirumalai.

Distribution : India (S. India, Kashmir to Assam).

Elsewhere : Sri Lanka, N. Myanmar.

Habits and habitats : Found around forest streams, in the dry weather. The species can

also be met with settling on the damp sand at the edges of streams as well as in the depths of forests where there is sunshine.

Status : Rare in South India; common to very common elsewhere.

REFERENCES

- KUNTE, K. 2000. *Butterflies of Peninsular India, India—A Lifescape*. University Press (India) Limited, Hyderabad, : 254.
- SATYAMURTI, S.T. 1966. *Descriptive catalogue of the Butterflies in the collection of the Madras Government Museum*. Bulletin, Madras Government Museum, (N.H. VII, No. 1) : 255.
- WYNTER-BLYTH, M.A. 1957. *Butterflies of the Indian Region*. Bombay Natural History Society, Bombay : 523.

INSECTA : HYMENOPTERA : FORMICIDAE

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INTRODUCTION

This paper lists a total of 109 species of Formicidae (Hymenoptera : Insecta) belonging to 36 genera and 7 subfamilies, collected from Biligiri Rangaswamy hills. All the 108 species are first records of the group from this sanctuary. This paper also gives a key to identify the ant species of Biligiri Rangaswamy Temple Wildlife Sanctuary.

Key to the Ants of Biligiri Rangaswamy Temple Hills

Key to Subfamilies

1. Ant with a single reduced or isolated segment (the petiole) between alitrunk and gaster 2
- Ant with 2 reduced or isolated segments (the petiole and the post petiole) between alitrunk and gaster 5
2. Apex of gaster with semicircular to circular acidopore FORMICINAE
- Apex of gaster lacking an acidopore 3
3. Pygidium or hypopygium armed with peg like teeth or short spines. Propodeal spiracle high on side and situated far forward on the sclerite DORYLINAE
- Pygidium and hypopygium unarmed. 4
4. Sting vestigial or absent DOLICHODERINAE
- Sting present and functional PONERINAE

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- 5. Eyes present and conspicuous 6
- Eyes absent and antennae with 8-10 segments AENICTINAE
- 6. Promesonotal suture present, freely flexible. Hind tibia with a conspicuous pectinate apical spur PSEUDOMYRMICINAE
- Promesonotal suture vestigial to absent, fused and inflexible. Hind tibia without a pectinate apical spur MYRMICINAE

Key to the species of Subfamily AENICTINAE

Commonly known as 'army ants', the single genus of this subfamily is *Aenictus*. *Aenictus* forms large colonies, consisting of tens of even hundreds of thousands of workers, apparently are specialized predators of other ant species.

In Biligiri Rangaswamy Temple, this genus is represented by 5 known species and one undescribed species.

- 1. Mandibles narrow, 3-4 toothed separated from the anterior clypeal border by a large gap *A. brevicornis*
- Mandibles broad and triangular, bearing a distinct apical and preapical tooth followed by at least 4 or 5 smaller teeth or denticles 2
- 2. "Typhlatta spots" present; these are a pair of large, pale, circular areas covering most of the posterolateral portions of the head and contrasting sharply with the much darker remainder of the head *A. fergusoni*
- "Typhlatta spots" absent 3
- 3. Pronotum densely micro reticulate and opaque *A. aratus*
- Pronotum smooth and shining 4
- 4. Longitudinal rugulae present on propodeal dorsum *A. punensis*
- Longitudinal rugulae lacking on propodeal dorsum *A. pachycerus*

Key to the genera of Subfamily DOLICHODERINAE

This subfamily is represented by 3 genera.

- 1. Petiole in profile usually a simple, transversely flattened strip, never equipped with a standing or anteriorly inclined scale 2
- Petiole in profile surmounted by a node or scale that maybe inclined forward *Bothriomyrmex*

2. In dorsal view 5 gastral tergites visible, the fifth gastral tergite dorsal; pronotum commonly with 2-10 erect hairs *Technomyrmex*
- In dorsal view 4 gastral tergites visible, the fifth gastral tergite ventral; pronotum generally lacking erect hairs *Tapinoma*

Genus *Bothriomyrmex*

Bothriomyrmex wroughtonii is representative of the genus *Bothriomyrmex* in BRTWLS which has the following identifying character.

1. Mandibles armed with 4-6 teeth. Species yellowish brown in colour.

Genus *Tapinoma*

In BRTWLS, this genus is represented by 2 species.

1. Antennae long, the scape extending beyond the top of the head *T. melanocephalum*
- Antennae short, the scape not extending beyond the top of the head *T. indicum*

Genus *Technomyrmex*

In BRTWLS, this genus is represented by 2 species, one of them being undescribed.

Technomyrmex albipes commonly known as the tramp species or the white footed ant is identified by the following character;

1. Anterior margin of clypeus with a deep crescentic emargination.
2. Black, the tarsi white or brownish white in marked contrast.

Subfamily DORYLINAE

These army ants generally subterranean, occurs in a wide range of habitats, including cultivated land, is represented by a single genus *Dorylus*. In BRTWLS this genus is represented by a single species.

Dorylus orientalis

1. Sub petiolar process a simple, low lobe; head of major workers distinctly broader than long.

Key to the genera of Subfamily FORMICINAE

This subfamily consists of stingless ants, which instead posseses a formic acid projecting system of which the acidopore is the orifice. In Biligiri Rangaswamy Temple, Formicinae is represented by 7 genera.

1. Antennae with 11 segments 2
- Antennae with 12 segments 3
2. Propodeum armed with a pair of spines, teeth or tubercles *Lepisiota*
- Propodeum unarmed *Plagiolepis*
3. Mandibles extended into extremely long slender blades *Myrmoteras*
- Mandibles sub triangular to triangular 4
4. Antennal sockets situated close to the posterior clypeal margin; head and alitrunk with stout setae arranged in distinct pairs *Paratrechina*
- Antennal sockets situated far behind the posterior clypeal margin 5
5. Mandible with 10 or more teeth or denticles in total. Petiole reduced to an elongate low node that allows the gaster to be reflexed over the alitrunk *Oecophylla*
- Mandible usually with 5-7 teeth. Petiole an erect node or scale, the gaster not capable of reflexion over the alitrunk 6
6. Spines or teeth present on pronotum, propodeum, petiole, or on two or all of these, tergite of first gastral segment large accounting for at least half the length of the gaster in dorsal view *Polyrhachis*
- Spines or teeth absent; tergite of first gastral segment shorter, accounting for distinctly less than half the length of the gaster in dorsal view *Camponotus*

Genus *Camponotus*

This genus is represented by 6 species in Biligiri Rangaswamy Temple, one of them remains unnamed.

1. Thorax viewed from side forming a regular arch 2
- Regular arch of thorax interrupted at the meso-metanotal suture by the metanotum forming an angle with the mesonotum *C. sericeus*
2. Head thorax and abdomen black 3
- Head thorax and abdomen never all black or all yellow 4
3. Head of minor worker posteriorly constricted so as to form a collar *C. angusticollis*
- Head of minor worker posteriorly narrow but not constricted to form a collar *C. compressus*
4. Tibia cylindrical and without spines *C. infuscus*

- **Tibia compressed and spined beneath.....** *C. irritans*

Genus *Lepisiota*

In Biligiri Rangaswamy Temple, this genus is represented by 3 species.

1. **Upper lateral angles of the petiole surmounted by long, fine acute verticle spines** *L. opaca*
- **Upper lateral angles of the petiole surmounted by short thick spines or the petiole without spines or teeth** 2
2. **Head punctured, opaque; head and abdomen reddish brown** *L. fergusoni*
- **Head highly polished and shining; head, thorax and abdomen black** *L. capensis*

Genus *Myrmoteras*

In BRTWLS, this genus is represented by one species.

Myrmoteras indicum

1. **Mandible with single apical denticle.**
2. **Middle tibiae thick (26-27% as wide as long).**

Genus *Oecophylla*

The weaver ant known for using its larvae to spin silk with which its nest of leaves is constructed is represented by only one species in India.

Oecophylla smaragdina

1. **Petiole very slender its stigmata seen from above very prominent, its ventral surface nearly straight or very feebly convex in profile.**

Genus *Paratrechina*

In BRTWLS, this genus is represented by 2 species, one of which is undescribed.

Paratrechina longicornis

1. **Scape of antennae remarkable long, extending beyond the top of the head by more than half its length.**

Genus *Plagiolepis*

In BRTWLS, this genus is represented by 2 species, one of which is undescribed.

Plagiolepis exigua

1. Length below 2mm.
2. Colour pale dull brownish yellow
3. Head, thorax and abdomen punctate.

Genus *Polyrhachis*

These spined arboreal ants make their nest either between the leaves or in the hollows of trees and bamboos are represented in BRTWLS by 4 species.

1. Pronotum and metanotum with a spine or tooth on each side, mesonotum unarmed 2
- Pronotum and mesonotum unarmed, metanotum with a broad triangular spine on each side *P. exercita*
2. Spines or teeth on the pronotum very small *P. punctillata*
- Spines or teeth on the pronotum conspicuous 3
3. Metanotal spines forming hooks; abdomen with dense golden pile *P. rupicapra*
- Metanotal spines not forming hooks; head, thorax and abdomen black *P. lacteipennis*

Key to genera of Subfamily MYRMICINAE

In BRTWLS, this subfamily is represented by 16 genera.

1. Antennal scrobes present which run below the eye *Cataulacus*
- Antennal scrobes absent, or present but running above the eyes 2
2. Postpetiole articulated on the dorsal surface of the first gastral segment; the gaster in dorsal view, roughly heart shaped *Crematogaster*
- Postpetiole articulated on the anterior surface of the first gastral segment 3
3. Antennae with a conspicuous 2 segmented club 4
- Antennae with a 3 segmented club or without a developed apical club 8
4. Antennae with 4-6 segments 5
- Antennae with 8-12 segments 6
5. Labrum with reduced distal lobes and specialized proximal shield; maximum gape of mandibles 170 degrees or more *Strumigenys*

- Labrum with exaggerated elongate distal lobes and unspecialized proximal shield; maximum gape of mandibles 90 degrees or less *Pyramica*
- 6. Antennae with 12 segments *Cardiocondyla*
- Antennae with 11 segments 7
- 7. Median portion of clypeus longitudinally bicarinate; workers dimorphic without intermediates *Oligomyrmex*
- Median portion of clypeus not longitudinally bicarinate; workers polymorphic with a graded series of intermediates between minors and majors *Pheidologeton*
- 8. Antennae with 7 segments *Myrmicaria*
- Antennae with 9-12 segments 9
- 9. Antennae with 9 segments *Meranoplus*
- Antennae with 10-12 segments 10
- 10. Antennae with 10 segments *Tetramorium* (part)
- Antennae with 11-12 segments 11
- 11. Antennae with 11 segments 12
- Antennae with 12 segments 15
- 12. Sting with a lamellate appendage projecting dorsally, close to the sting apex but at an angle to the shaft *Tetramorium* (part)
- Sting usually simple and lacking a lamellate appendage 13
- 13. Propodeum armed with a pair of spines or teeth 14
- Propodeum unarmed, evenly rounded *Monomorium*
- 14. Propodeum armed with a pair of spines, which curve upwards *Recurvidris*
- Propodeum armed with a pair of spines or teeth more or less straight and directed posteriorly or posterodorsally *Lophomyrmex*
- 15. Petiole sessile to subsessile, without a roughly horizontal anterior peduncle; petiole with a large ventral process *Vollenhovia*
- Petiole pedunculate without a ventral process 16
- 16. Head elongate and narrow in all workers; monomorphic species *Aphaenogaster*
- Head broad in media and major workers; polymorphic species *Pheidole*

Genus *Aphaenogaster*

One species known from BRTWLS.

Aphaenogaster beccarii

1. Metanotum transversely rugose above, coarsely striate on the sides.

Genus *Cardiocondyla*

3 species from BRTWLS, one of which is undescribed.

1. Head posteriorly rounded with no distinct posterior margin *C. nuda*
- Head with a distinct posterior margin; post petiole distinctly broader than long
..... *C. wroughtonii*

Genus *Cataulacus*

2 species known from BRTWLS.

1. Legs with the tibiae orange red above *C. taprobane*
- Legs entirely black *C. latus*

Genus *Crematogaster*

The heart shaped abdomen ant, which makes its carton nest on trees or under stones, is represented in BRTWLS by 10 species, one of which, being undescribed.

1. Head smooth and shining 2
- Head entirely sculptured, not smooth 7
2. Antennal club 4 jointed *C. wroughtonii*
- Antennal club 3 jointed 3
3. Pronotum sculptured 4
- Pronotum smooth, not sculptured 6
4. Eyes elongate *C. hodgsoni*
- Eyes round 5
5. Metanotal spines slender, not thick at base, divergent, straight, not curved
..... *C. subnuda*
- Metanotal spines thick at base, less divergent, curved *C. anthracina*

6. Promesonotal suture obsolete or very slight *C. ransonneti*
- Promesonotal suture well marked, distinct *C. dalyi*
7. Metanotal spines shorter than metanotum 8
- Metanotal spines longer than metanotum *C. rogenhoeferi*
8. Metanotal spines, slender, apex directed backwards and outwards *C. dohrni*
- Metanotal spines very thick at base, apex directed backwards and inwards *C. subnuda*

Genus *Lophomyrmex*

One species known from BRTWLS.

Lophomyrmex quadrispinosus

1. Pronotum armed with two spines or teeth.
2. Petiole sculptured.

Genus *Meranoplus*

One species known from Biligiri Rangaswamy Temple.

Meranoplus bicolor

1. Promesonotal shield undivided.
2. Mesonotum armed posteriorly with two long acute spines, pronotum dentate.

Genus *Monomorium*

12 species known from Biligiri Rangaswamy Temple, one of which is undescribed.

1. Head rugulose or striate, opaque 2
- Head smooth and shining 3
2. In dorsal view, post petiole distinctly broader than petiole *M. dichroum*
- In dorsal view, post petiole not broader than petiole *M. indicum*
3. Antennae 11 jointed *M. orientale*
- Antennae 12 jointed 4
4. Scape of antennae extending beyond top of the head *M. destructor*

- Scape of antennae not extending beyond top of the head 5
- 5. Post petiole broader than petiole 6
- Post petiole not broader than petiole *M. monomorium*
- 6. Length 1.5-2mm *M. floricola*
- Length 3-3.7mm *M. latinode*

Genus *Myrmicaria*

One species known from BRTWLS.

Myrmicaria brunnae

1. Head striate, mandibles finely striate, pronotum anteriorly convex, not raised.

Genus *Oligomyrmex*

One species known from BRTWLS.

Oligomyrmex asinus

1. Length under 5 mm, colour yellow.
2. Post petiole much broader than long.

Genus *Pheidole*

11 species known from BRTWLS, of which 5 are undescribed.

- 1. Petiole with a projection or appendix beneath 2
- Petiole with no projection or appendix beneath 3
- 2. Metanotal spines clavate and obtuse towards the apex like halteres or poisers of a dipteron *P. spathifera*
- Metanotal spines acute at apex, not clavate; abdomen finely striate from end to end *P. sharpi*
- 3. Pronotum and mesonotum forming a single convexity, transverse mesonotal furrow obsolete 4
- Pronotum and mesonotum not forming a single convexity, transverse mesonotal furrow always present *P. multidens*

- 4. Head as long as broad *P. sykesii*
- Head distinctly longer than broad 5
- 5. Occiput smooth and shining *P. woodmasoni*
- Occiput sculptured *P. watsoni*

Genus *Pheidologeton*

2 species known from BRTWLS.

- 1. Colour dark chestnut brown; length over 2.5 mm *P. diversus*
- Colour light brownish yellow; length under 2.5 mm *P. affinis*

Genus *Recurvidris*

One species is known from BRTWLS.

Recurvidris recurvispinosa

- 1. Head, thorax and abdomen, finely, closely punctured.
- 2. Length 2 mm.

Genus *Tetramorium*

7 species known from BRTWLS, 3 of which are undescribed.

- 1. Pilosity very dense and woolly, whitish in colour, concealing the sculpture *T. walshii*
- Pilosity not very dense, sculpture clearly visible 2
- 2. Frontal carinae short, terminating at or in front of the level of the eyes .. *T. inglebyi*
- Frontal carinae long, projecting back beyond the level of the eyes 3
- 3. First gastral tergite sculptured, strongly rugulose *T. rugigaster*
- First gastral segment smooth, at most with sparse, pits from which hairs arise *T. mixtum*

Genus *Pyramica*, *Strumigenys* and *Vollenhovia* have undescribed species respectively.

Key to the species of Subfamily PONERINAE

- 1. Mandibles long and linear, in full-face view inserted in the middle of the anterior margin of the head *Anochetus*

- Mandibles linear to triangular, in full-face view inserted at the anterolateral corners of the head 2
- 2. Basal portion of mandibles with a distinct circular, near-circular or elongate pit or fovea dorsolaterally 3
- Basal portion of mandibles without a pit or fovea 4
- 3. Dorsal surface of middle tibia and middle basitarsus with traction-enhancing thickened peg like setae or narrow cuticular spines mixed with finer pilosity. Eyes usually absent, very rarely vestigially present *Cryptopone*
- Dorsal surface of middle tibia and middle basitarsus without peg like setae or spines *Pachycondyla* (part)
- 4. Pretarsal claws of hind leg, on the inner curvature behind the apical point, either pectinate or equipped with 1 or more teeth 5
- Pretarsal claws of hind leg, on the inner curvature behind the apical point, unarmed, not pectinate and without teeth 6
- 5. Ocelli present. Mandibles forceps like, each blade with a double longitudinal row of teeth *Harpegnathos*
- Ocelli absent. Mandibles very variable in shape but never with 2 rows of teeth on each blade *Leptogenys*
- 6. Alitrunk laterally with a conspicuous, pocket like excavation above the mesopleuron. Petiole a node and armed with dorsally with a pair of spines *Diacamma*
- Alitrunk laterally without a pocket like excavation above the mesopleuron. Petiole a distinct unarmed node *Pachycondyla* (part)

Genus *Anochetus*

Two species of *Anochetus* are known from BRTWLS, one of which is undescribed.

Anochetus graeffei

1. Mandible with three apical teeth.
2. Metanotum not bidentate.
3. Head and thorax with longitudinal striae.

Genus *Cryptopone*

One undescribed species known from BRTWLS.

Genus *Diacamma*

One species of *Diacamma* is described from BRTWLS.

Diacamma cyaniventre

1. First abdominal segment smooth, not striate.

Genus *Harpegnathos*

One species of this jumping ant is found in BRTWLS

Harpegnathos saltator

1. Head thorax and petiole ferruginous red, coarsely punctured.
2. Abdomen black and shining.

Genus *Leptogenys*

5 species from BRTWLS, one of which is undescribed.

1. Petiole squamiform, compressed longitudinally, its upper margin narrow, obtuse 2
- Petiole not compressed longitudinally, broader above, with anterior and posterior margins 3
2. Clypeus tridentate anteriorly *L. dentilobis*
- Clypeus not dentate *L. processionalis*
3. Head striate and black; thorax and abdomen shining black *L. kitteli*
- Head, thorax and abdomen with a bluish metallic reflection; petiole elongate with a sloping curve from back to front *L. chinensis*

Genus *Pachycondyla*

6 species from BRTWLS, one of which is undescribed.

1. Posterior margin of petiole armed with a number of blunt processes *P. rufipes*
- Posterior margin of petiole without blunt processes 2
2. Length under 6mm *P. annamitus*
- Length over 6mm 3
3. Length under 8mm 4

- Length over 8mm *P. sulcata*
- 4. Length over 7mm *P. leewenhoeki*
- Length under 7mm; first and second flagellar segment equal in length *P. tesseronoda*

Key to the species of Subfamily PSEUDOMYRMICINAE

The sole representative of Pseudomyrmicinae in the Old World is the genus *Tetraponera*.

In BRTWLS, this arboreal ant which nests in hollow branches of trees is represented by 3 species.

- 1. Head with three distinct ocelli *T. rufonigra*
- Head almost always lacking ocelli, very rarely with 2 or 3 faint ocelli (in a few larger workers of *T. nigra*) 2
- 2. Mandible slender, with three teeth on masticatory margin, and 1-2 denticles on the basal margin *T. allaborans*
- Mandibles more robust, with 4 teeth on the masticatory margin and 0-1 denticles on the basal margin *T. nigra*

SYSTEMATIC ACCOUNT

Order HYMENOPTERA

Superfamily VESPOIDEA

Family FORMICIDAE

1. Subfamily AENICTINAE

1. Genus *Aenictus* Shuckard

1840. *Aenictus* Shuckard, Ann. Nat. Hist., 5 : 266. Type species : *Aenictus ambiguous* by original description.

1. *Aenictus aratus* Forel

1900. *Aenictus aratus* Forel, Ann. Soc. Ent. Belgique, 44 : 74.

Material examined : South India : Karnataka: BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Almost throughout India.

Elsewhere : Sri Lanka, Philippines, New Guinea, Australia.

2. *Aenictus brevicornis* Mayr

1879. *Typhlatta brevicornis* Mayr, Verh. Zool-Bot. Ges. Wien, 28 : 669.

1893. *Aenictus brevicornis*, Dalla Torre, Cat. Hymenop., : 7.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : South and East India.

3. *Aenictus fergusoni* Forel

1901. *Aenictus fergusoni* Forel, J. Bom. Nat. Hist. Soc., 13 : 473.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Southern and Western India, Sikkim.

Elsewhere : Myanmar.

4. *Aenictus pachycerus* Smith

1858. *Eciton pachycerus* Smith, Cat. Hymenop. Ins. Formicidae, 6 : 153.

1893. *Aenictus pachycerus*, Dalla Torre, Cat. Hymenop., : 7.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Throughout the Indian sub-continent.

5. *Aenictus punensis* Forel

1901. *Aenictus punensis* Forel, J. Bom. Nat. Hist. Soc., 13 : 476.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Western and Southern India.

6. *Aenictus* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

II. Subfamily DOLICHODERINAE

2. Genus *Bothriomyrmex* Emery

7. *Bothriomyrmex wroughtonii* Forel

1895. *Bothriomyrmex wroughtonii* Forel, J. Bom. Nat. Hist. Soc., 9 : 470.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Southern and NorthWestern India.

Elsewhere : Sri Lanka.

3. Genus *Tapinoma* Foerster

8. *Tapinoma melanocephalum* (Fabricius)

1793. *Formica melanocephala* Fabricius, Ent. Syst., 2 : 353.

1903. *Tapinoma melanocephalum*, Bingham, Fauna Brit. India, Hymenoptera, 2 : 304.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. (DRP).

Distribution : Almost throughout the country.

9. *Tapinoma indicum* Forel

1895. *Tapinoma indicum* Forel, J. Bom. Nat. Hist. Soc., 9 : 472.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Northwestern India, Karnataka.

4. Genus *Technomyrmex* Mayr

10. *Technomyrmex albipes* Smith

1861. *Formica albipes* Smith, J. Proc. Linn. Soc. Zoology, 6 : 38.

1888. *Technomyrmex albipes*, Emery, Zeit. Wissen. Zoo., 46 : 392.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : (Spread over the tropics of the Old World. Considered to be a species.)

11. *Technomyrmex* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

III. Subfamily DORYLINAE

5. Genus *Dorylus* Fabricius

1793. *Dorylus* Fabricius, Ent. Syst., 2 : 365. *Type species* : *Vespa helvola*, by monotypy.

12. *Dorylus orientalis* Westwood

1835. *Dorylus orientalis* Westwood, Ber. Zoo, Soc. Lond., 3 : 72.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar, and Indonesia.

IV. Subfamily FORMICINAE

6. Genus *Camponotus* Mayr

1861. *Camponotus* Mayr, Die. Europ. Formicid., : 35. *Type species* : *Formica ligniperda* by subsequent designation of Bingham, 1903 : 347.

13. *Camponotus angusticollis* Jerdon

1851. *Formica angusticollis* Jerdon, Mad. J. Lit. Sci., 17 : 120.

1863. *Camponotus angusticollis*, Roger, Ber. Ent. Zeit., 7 : 3.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Western, Southern and Central India, Assam.

Elsewhere : Myanmar.

14. *Camponotus compressus* Fabricius

1787. *Formica compressa* Fabricius, Mant. Insect., 1 : 307.

1892. *Camponotus maculatus* Fabricius, r. *compressus*, Forel, J. Bom. Nat. Hist. Soc., 7 : 229 & 240.

1903. *Camponotus compressus*, Bingham, Fauna Brit. India, Hymenoptera, 2 : 351.

1925. *Camponotus (Tanaemyrmex) compressus*, Emery, Genera Insect., 183 : 98.

Material examined : South India: Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : South India, Assam, and West Bengal.

Elsewhere : Sri Lanka, Nepal, Myanmar, Philippines, Africa.

15. *Camponotus infuscus*, Forel

1892. *Camponotus maculatus* r. *infuscus*, Forel J. Bom. Nat. Hist. Soc., 7 : 242.

Material examined : South India : Karnataka: BRTWLS, 1999, coll. DRP.

Distribution : Sri Lanka, Upper Myanmar.

16. *Camponotus irritans*, Smith

1857. *Formica irritans* Smith, J. Proc. Linn. Soc. Lond, Zoology, 2 : 55 & 58.

Material examined : South India : Karnataka: BRTWLS, 1999, coll. DRP.

Distribution : Sri Lanka, Malay Peninsula.

17. *Camponotus paria* Emery

- 1889. *Camponotus micans* r. *paria* Emery, *Ann. Mus. Civ. Stor. Nat. Genova*, 27 : 513.
- 1892. *Camponotus rufoglaucus* r. *paria*, *J. Bom. Nat. Hist. Soc.*, 7 : 226 & 238.
- 1903. *Camponotus paria*, Bingham, *Fauna Brit. India, Hymenoptera*, 2 : 364.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Throughout India.

Elsewhere : Myanmar, Sri Lanka.

18. *Camponotus sericeus* (Fabricius)

- 1798. *Formica sericea* Fabricius, *Supp. Ent. Syst.*, : 279.
- 1862. *Camponotus sericeus*, Mayr, *Verh. Zool-Bot. Ver. Wien*, 3 : 675.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Almost throughout India.

Elsewhere : Myanmar, Sri Lanka.

19. *Camponotus* sp. 1

Material examined : South India: Karnataka: BRTWLS, 1999, coll. DRP.

7. Genus *Lepisiota*

- 1861. *Acantholepis* Mayr. *Europ. Formicid.*, 42. *Type species* : *Hypoclinea fraunefeldi* Mayr, 1855, from Europe.

20. *Lepisiota fergusoni* Forel

- 1895. *Acantholepis fergusoni* Forel, *J. Bom. Nat. Hist. Soc.*, 9 : 459.

Material examined : South India : BRTWLS, 1999, coll. DRP.

Distribution : Karnataka, South India.

21. *Lepisiota opaca* Forel

- 1892. *Acantholepis opaca* Forel, *Ann. Soc. Ent. Belge.*, 36 : 43.
- 1903. *Acantholepis opaca*, Bingham, *Fauna Brit. India, Hymenoptera*, 2 : 318.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Goa, Karnataka.

22. *Lepisiota capensis* Mayr

1862. *Acantholepis capensis* Mayr, Verh. Zool-Bot. Ver. Wien, 3 : 699.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Himalaya, Central, South India.

Elsewhere : Sri Lanka.

8. Genus *Myrmoteras* Forel

1893. *Myrmoteras* Forel, Ann. Soc. Ent. Belge., 37 : 607. *Type species* : *Myrmoteras binghamii*, by monotypy.

23. *Myrmoteras indicum* Moffett

1985. *Myrmoteras (Myagroteras) indicum* Moffett, Bull. Mus. Comp. Zoo., 151 : 37.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Karnataka, Kerala, Tamilnadu.

9. Genus *Oecophylla* Smith

1860. *Oecophylla* Smith, J. Proc. Linn. Soc. Lond., Zool., 5 : 101. *Type species* : *Formica virescens* Fabricius, 1775, from Australia.

24. *Oecophylla smaragdina* (Fabricius)

1775. *Formica smaragdina* Fabricius, Syst. Ent., 1775 : 828.

1903. *Oecophylla smaragdina*, Bingham, Fauna Brit. India, Hymenoptera, 2 : 311.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Except the desert and treeless areas.

Elsewhere : Australia, Myanmar, Sri Lanka, China, New Guinea.

10. Genus *Paratrechina* Motschoulsky

1863. *Paratrechina* Motschoulsky, Bull. Soc. Nat. Moscou., 36 : 15. *Type species* : *Paratrechina currens* Motschousky, 1863.

25. *Paratrechina longicornis* Latreille

1802. *Formica longicornis* Latreille, *Hist. Nat. Fourmis.*, : 113.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Throughout India.

Elsewhere : Spread over all tropical countries.

26. *Paratrechina* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

11. Genus *Plagiolepis* Mayr

1861. *Plagiolepis* Mayr. *Die. Euro. Formic.*, 42. *Type species* : *Formica pygmaea*, by monotypy.

27. *Plagiolepis exigua* Forel

1894. *Plagiolepis exigua* Forel, *J. Bombay. nat. Hist. Soc.*, 8 : 417.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India.

Elsewhere : Madagascar.

28. *Plagiolepis* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

12. Genus *Polyrhachis* Smith

1857. *Polyrhachis* Smith, *Proc. Ent. Soc. Wash.*, 58. *Type species* : *Formica bihamata*, by original designation.

29. *Polyrhachis exercita* Walker

1859. *Formica exercita* Walker, *Ann. Mag. Nat. Hist.*, 4 : 370.

1932. *Polyrhachis exercita*, Donisthorpe, *Ann. Mag. Nat. Hist.*, 9 : 575.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India.

Elsewhere : Sri Lanka.

30. *Polyrhachis lacteipennis* Smith

1858. *Polyrhachis lacteipennis* Smith, *Cat. Hymnop. Ins.*, 6 : 60.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Almost throughout India.

31. *Polyrhachis punctillata* Roger

1863. *Polyrhachis punctillata* Roger, Ber. Ent. Zeit., 7 : 152.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Southern and Northwest India.

Elsewhere : Sri Lanka, Myanmar.

32. *Polyrhachis rupicapra* Roger

1863. *Polyrhachis rupicapra* Roger, Ber. Ent. Zeit., 7 : 154.

Material examined : South India: Karnataka: BRTWLS, 1999, coll. DRP.

Distribution : Punjab, Karnataka.

Elsewhere : Sri Lanka.

V. Subfamily MYRMICINAE

13. Genus *Aphaenogaster* Mayr

1853. *Aphaenogaster* Mayr. Verh. Zool.-Bot. Ver. Wien., 3 : 107. *Type species* : *Aphaenogaster sardoa* Mayr., from Italy.

33. *Aphaenogaster beccarii* (Emery)

1887. *Ischnomyrmex beccarii* Emery, Ann. Mus. Civ. Stor. Nat. Genoa., 25 : 456.

1903. *Aphaenogaster beccarii*, Bingham, Fauna Brit. India, Hymenoptera, 2 : 271.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Karnataka, Maharashtra.

Elsewhere : Indonesia.

14. Genus *Cardiocondyla* Emery

1869. *Cardiocondyla* Emery. Ann. Acc. Asp. Nat., (2)2 : 20. *Type species* : *Cardiocondyla elegans* by monotypy.

34. *Cardiocondyla nuda* (Mayr)

1886. *Leptothorax nudus* Mayr, Sit. Aka. Wis. Mat. Nat. Cla., 53 : 508.

1881. *Cardiocondyla nuda*, Forel, *Mitt. Munc. Ent. Ver.*, 5 : 6.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Sikkim, West Bengal and South India.

Elsewhere : Sri Lanka.

35. *Cardiocondyla wroughtonii* Forel

1890. *Emeryia wroughtonii* Forel, *Ann. Soc. Ent. Belg. Comp. rendus*, 34 : cxi.

1892. *Cardiocondyla wroughtonii* Forel, *Ann. Soc. Ent. Belg.*, 36 : 461.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India.

36. *Cardiocondyla* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

15. Genus *Cataulacus* Smith, F.

37. *Cataulacus latus* Forel

1891. *Cataulacus latus* Forel, *Hist. Nat. Hym.*, 20 : 144.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : West Bengal, Orissa and South India.

Elsewhere : Myanmar.

38. *Cataulacus taprobane* Smith, F.

1853. *Cataulacus taprobanae* Smith, *Trans. Ent. Soc.*, II : 225.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : South India.

Elsewhere : Sri Lanka.

16. Genus *Crematogaster* Lund

1831. *Crematogaster* Lund, *Ann. Sci., Nat.*, 23 : 132. *Type species* : *Formica scutellaris*, by subsequent designation of Bingham, 1903 : 124.

39. *Crematogaster anthracina* Smith

1857. *Crematogaster anthracinus* Smith, F., *J. Proc. Linn. Soc. Lond. Zoology*, 2 : 75.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Sri Lanka, Myanmar, Malayan sub region.

40. *Crematogaster dalyi* Forel

1902. *Crematogaster dalyi* Forel, *Rev. Sui. Zoo.*, 10 : 201.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western Ghats.

41. *Crematogaster dohrni* Mayr

1878. *Crematogaster dohrni* Mayr, *Verh. Zool-Bot. Ges. Wien*, 28 : 682.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : India.

Elsewhere : Myanmar and Sri Lanka.

42. *Crematogaster hogsoni* Forel

1902. *Crematogaster hogsoni* Forel, *Rev. Sui. Zoo.*, 10 : 204.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western Ghats.

Elsewhere : Myanmar.

43. *Crematogaster ransonneti* Mayr

1868. *Crematogaster ransonneti* Mayr, *Verh. Zoo-Bot. Ges. Wien*, 18 : 287.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Sikkim, South India.

Elsewhere : Sri Lanka.

44. *Crematogaster rogenhoeferi* Mayr

1879. *Crematogaster rogenhoeferi* Mayr, *Verh. Zoo-Bot. Ges. Wien*, 28 : 683.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India, West Bengal, Sikkim, Assam.

Elsewhere : Sri Lanka, Myanmar.

45. *Crematogaster rothneyi* Mayr

1879. *Crematogaster rothneyi* Mayr, Verh. Zoo-Bot. Ges. Wien, 28 : 685.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Karnataka, West Bengal, Maharashtra and Sikkim.

46. *Crematogaster subnuda* Mayr

1879. *Crematogaster subnuda* Mayr, Verh. Zoo-Bot. Ges. Wien, 28 : 682.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar.

47. *Crematogaster wroughtonii* Forel

1902. *Crematogaster wroughtonii* Forel. Rev. Suisse. Zool., 10 : 206.

Material examined : South India: Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India.

48. *Crematogaster* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

17. Genus *Lophomyrmex* Emery

1892. *Lophomyrmex* Emery, Ann. Mus. Civ. Stor. Nat. Genova., 22 : 114. *Type species* : *Oecodoma quadrispinosa* Jerdon, Madras J. Lit. Sci., 17 : 111.

49. *Lophomyrmex quadrispinosus* (Jerdon)

1851. *Oecodoma quadrispinosa* Jerdon, Madras J. Lit. Sci., 17 : 111.

1903. *Lophomyrmex quadrispinosus*, Bingham, Fauna Brit. India, Hymenoptera, 2 : 195.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Kerala, Orissa, Sikkim.

18. Genus *Meranoplus* Smith

1854. *Meranoplus* Smith, Trans. Ent. Soc., (2)2 : 224. *Type species* : *Cryptocerus bicolor* Guerin 183, from India.

50. *Meranoplus bicolor* (Guerin)

1844. *Cryptocerus bicolor* Guerin, *Iconog. Regn. Anim. Cuv. Ins.*, 3 : 425.

1903. *Meranoplus bicolor*, Bingham, *Fauna Brit. India, Hymenoptera*, 2 : 168.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Throughout India, except in the hot dry plains of North Western India and Central India.

19. Genus *Monomorium* Mayr

1855. *Monomorium* Mayr. *Verh. Zoo.-Bot. Ges., Wien.*, 5 : 462. *Type species* : *Monomorium minutum* Mayr, 1855 from Europe.

51. *Monomorium criniceps* Mayr

1879. *Holcomyrmex criniceps* Mayr, *Verh. Zoo-Bot. Ges. Wien.*, 28 : 672.

1922. *Monomorium criniceps*, Emery, *Gen. Ins.* 174B : 181.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India.

Elsewhere : Myanmar, Sri Lanka.

52. *Monomorium destructor* Jerdon

1851. *Atta destructor* Jerdon, *Mad. J. Lit. Sci.*, 17 : 105.

1893. *Monomorium destructor* Dalla Torre, *Cat. Hym.*, 7 : 66.

Material examined : South India : Karnataka, BRTWLS, 1999, coll. DRP.

Distribution : Throughout India.

Elsewhere : A species easily transported and spread in both hemispheres.

53. *Monomorium dichroum* Forel

1902. *Monomorium dichroum* Forel, *Rev. Suisse. Zool.*, 10 : 212.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : South India.

54. *Monomorium floricola* Jerdon

1851. *Atta floricola* Jerdon, *Mad. J. Lit. Sci.*, 17 : 107.

1879. *Monomorium floricola*, Mayr, Verh. Zoo-Bot. Ges. Wien, 28 : 671.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Throughout India.

Elsewhere : Sri Lanka.

55. *Monomorium glabrum* André

1883. *Holcomyrmex glaber* André, Spe. Hym. Eur. Alg., 2 : 345.

1922. *Monomorium glaber*, Emery, Gen. Ins., 174B : 181.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India.

Elsewhere : Myanmar, Sri Lanka.

56. *Monomorium indicum* Forel

1902. *Monomorium salomonis* r. *indicum* Forel, Rev. Suisse. Zool., 10 : 213.

1903. *Monomorium indicum*, Bingham, Fauna Brit. India, Hymenoptera, 2 : 205.

Material examined : South India: Karnataka: BRTWLS, 1999, coll. DRP.

Distribution : South India, Maharashtra, Punjab.

Elsewhere : Myanmar.

57. *Monomorium latinode* Mayr

1872. *Monomorium latinode* Mayr, Ann. Mus. Civ. Stor. Nat. Genova, 2 : 152.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Indonesia, Taiwan.

58. *Monomorium monomorium* Bolton

1855. *Monomorium minutum*, Mayr, Verh. Zoo-Bot. Ges. Wien, 5 : 453.

1987. *Monomorium monomorium* Bolton, [replacement name], Bull. Brit. Mus., 54 : 287.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : South India.

Elsewhere : Africa, Southern Europe and North America.

59. *Monomorium latinode* Mayr

1872. *Monomorium latinode* Mayr, Ann. Mus. Civ. Sto. Nat. Cun., 2 : 152.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar, extending up to Borneo.

60. *Monomorium pharaonis* Linnaeus

1758. *Formica pharaonis*, Linnaeus Syst. Nat. ed., 10, 1 : 580.

1862. *Monomorium pharaonis*, Mayr, Verh. Zoo-Bot. Ges. Wien, 12 : 752.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Throughout India.

61. *Monomorium scabriceps* Mayr

1879. *Holcomyrmex scabriceps* Mayr, Verh. Zoo-Bot. Ges. Wien, 28 : 672.

1908. *Monomorium scabriceps*, Emery, Deut. Ent. Zeit., 1908 : 667.

Material examined : South India: Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Almost throughout India.

62. *Monomorium subopacum* Smith

1858. *Myrmica glyciphila* Smith, cat. Hym. Brit. Mus., 6 : 125.

1903. *Monomorium glyciphilum*, Bingham, Fauna Brit. India, Hymenoptera, 2 : 206.

1987. *Monomorium subopacum*, Bolton, Bull. Brit. Mus. (Nat. Hist.) (Ent.), 54 : 360.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : South India.

Elsewhere : Sri Lanka.

63. *Monomorium* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

20. Genus *Myrmicaria* Saunders

1842. *Myrmicaria* Saunders, Trans. Ent. Soc., 3 : 57. Type species : *Myrmicaria brunnea* Saunder, 1842, from India.

64. *Myrmicaria brunnea* Saunders

1842. *Myrmicaria brunnea* Saunders, *Trans. Ent. Soc. Lond.*, 3 : 57.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Throughout India, except the drier parts of the country.

21. Genus *Oligomyrmex* Mayr

1867. *Oligomyrmex* Mayr, *Tij. Ent.*, 2(10) : 110. *Type species* : *Oligomyrmex concinus*, by monotypy.

65. *Oligomyrmex asinus* Forel

1902. *Oligomyrmex asinus* Forel, *Rev. Sui. Zoo.*, 10 : 214.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : West Bengal, South India.

22. Genus *Pheidole* Westwood

1839. *Pheidole* Westwood, *An Int. Mod. Classification of Insects*, 2 : 219. *Type species* : *Atta providens* Sykes from India.

66. *Pheidole multidens* Forel

1902. *Pheidole multidens* Forel, *Rev. Sui. Zoo.*, 10 : 181.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India.

67. *Pheidole spathifera* Forel

1902. *Pheidole spathifera* Forel, *Rev. Sui. Zoo.*, 10 : 168.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India, Assam.

Elsewhere : Myanmar, Sri Lanka.

68. *Pheidole sharpi* Forel

1902. *Pheidole sharpi* Forel, *Rev. Suisse. Zool.*, 10 : 169 & 188.

Material examined : Southern India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Southern and Western India.

Elsewhere : Myanmar.

69. *Pheidole sykesii* Forel

1902. *Pheidole sykesii* Forel, *Rev. Suisse. Zool.*, **10** : 173.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Central India.

70. *Pheidole watsoni* Forel

1902. *Pheidole watsoni* Forel, *Rev. Suisse. Zool.*, **10** : 171.

1902. *Pheidole watsoni* Forel, *J. Bom. Nat. Hist. Soc.*, **14** : 541.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : West Bengal.

Elsewhere : Myanmar, Sri Lanka.

71. *Pheidole woodmasoni* Forel

1902. *Pheidole woodmasoni* Forel, *J. Asia. Soc. Bengal*, **54** : 180.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Almost throughout the Indian subcontinent.

Elsewhere : Sri Lanka.

72. *Pheidole* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

73. *Pheidole* sp. 2

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

74. *Pheidole* sp. 3

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

75. *Pheidole* sp. 4

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

76. *Pheidole* sp. 5

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

23. Genus *Pheidologeton* Mayr

77. *Pheidologeton affinis* (Jerdon)

- 1851. *Oecodoma affinis* Jerdon, *Madras J. Lit. Soc.*, 17 : 110.
- 1903. *Phidologiton affinis*, Bingham, *Fauna Brit. India, Hymenoptera*, 2 : 164.
- 1922. *Pheidologeton affinis*, Emery, *Genera Insect.*, 174c : 212.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Assam, Karnataka, Kerala, Maharashtra, Tamilnadu, West Bengal.

Elsewhere : Sri Lanka, Myanmar, South East Asia.

78. *Pheidologeton diversus* (Jerdon)

- 1851. *Oecodoma diversa* Jerdon, *Madras J. Lit. Sci.*, 17 : 109.
- 1903. *Phidologiton diversus*, Bingham, *Fauna Brit. India, Hymenoptera*, 2 : 162.
- 1951. *Pheidologeton diversus*, Chapman & Capco, *Monogr. Int. Sci. Tech. Manila*, 1 : 159.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Karnataka, Kerala, Maharashtra, Sikkim, West Bengal.

Elsewhere : Myanmar and extending to the Malayan sub region.

24. Genus *Pyramica* Roger

- 1862. *Pyramica* Roger, *Ber. Ent. Zeit.*, 6 : 251.
- 1999. *Pyrmica* Roger (genera revised), Bolton, *J. Nat. Hist.*, 33 : 1667. *Type species* : *Pyrmica gundlachi* Roger, by monotypy.

79. *Pyramica* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

80. *Pyramica* sp. 2

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

25. Genus *Recurvidris* Bolton

- 1890. *Trigonogaster* Forel, *Ann. Soc. Belg. Comptes-rendus*, 34 : cviii.
- 1992. *Recurvidris* Bolton, (replacement name), *Psyche*, 99 : 36. *Type species* : *Recurvidris recurvispinosa* Forel.

81. *Recurvidris recurvispinosa* Forel

1890. *Trigonogaster recurvispinosus* Forel, Ann. Soc. Belg. Comptes-rendus, 34 : cix.

1992. *Recurvidris recurvispinosa* Bolton, [replacement name], Psyche, 99 : 36.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Western and Southern India.

26. Genus *Strumigenys* Smith, F.

1860. *Strumigenys* Smith, F., J. Ent., 1 : 72. *Type species* : *Strumigenys mandibularis* Smith, F., by monotypy.

82. *Strumigenys* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

27. Genus *Tetramorium* Mayr

1855. *Tetramorium* Mayr, Verh. Zool.-Bot. Ges. Wien, 5 : 423. *Type species* : *Formica caespitum* Linnaeus, 1758, from Europe.

83. *Tetramorium inglebyi* Forel

1902. *Tetramorium inglebyi* Forel, Rev. Suisse, Zool., 10 : 233.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Kerala.

84. *Tetramorium mixtum* Forel

1902. *Tetramorium mixtum* Forel, Rev. Sui. Zoo., 10 : 236.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : South India.

85. *Tetramorium rugigaster* Bolton

1977. *Tetramorium rugigaster* Bolton, Bull. Brit. Mus., 36 : 114.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : South India (Karnataka and Kerala).

86. *Tetramorium walshi* Forel

1890. *Triglyphothrix walshi* Forel, Ann. Soc. Ent. Belg., 34 : cvii.

1985. *Tetramorium walshi* Bolton, *J. Nat. Hist.*, **19** : 247.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : West Bengal, Western and Southern India.

87. *Tetramorium* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

88. *Tetramorium* sp. 2

Material examined : South India : Karnataka: BRTWLS, 1999, coll. Ketha Gowda.

89. *Tetramorium* sp. 3

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

28. Genus *Vollenhovia* Mayr

90. *Vollenhovia* sp.1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

VI. Subfamily PONERINAE

29. Genus *Anochetus* Mayr

1861. *Anochetus* Mayr. *Die. Eur. Form.*, 53. *Type species* : *Odontomachus ghilianni*, by monotypy.

91. *Anochetus graeffei* Mayr

1870. *Anochetus graeffei* Mayr, *Verh. Zoo-Bot. Ges. Wien*, **20** : 961.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Western and Southern India, West Bengal, Sikkim.

Elsewhere : Myanmar.

92. *Anochetus* sp. 1

Material examined : South India: Karnataka: BRTWLS, 1999, coll. Ketha Gowda.

30. Genus *Cryptopone* Emery

1893. *Cryptopone* Emery, *Bull. Bim. Soc. Ent. Fran.*, **20** : ccixxv. *Type species* : *Cryptopone testacea*, by monotypy.

93. *Cryptopone* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

31. Genus *Diacamma* Mayr

1862. *Diacamma* Mayr, Verh. Zoo-Bot. Ges. Wien, 12 : 718. *Type species* : *Ponera rugosa*, by subsequent designation of Bingham 1903 : 75.

94. *Diacamma cyaneiventre* Andre

1887. *Diacamma cyaniventre* Andre, Rev. d'Ent., 6 : 293.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Kerala.

Elsewhere : Sri Lanka.

32. Genus *Harpegnathos* Jerdon

1851. *Harpegnathos* Jerdon, Mad. J. Lit. Sci., 17 : 116. *Type species* : *Harpegnathus saltator*, by monotypy.

95. *Harpegnathos saltator* Jerdon

1851. *Harpegnathos* Jerdon, Mad. J. Lit. Sci., 17 : 117.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Western and Southern India.

Elsewhere : Sri Lanka.

33. Genus *Leptogenys* Roger

1858. *Pachycondyla* Smith, Catalogue of Hymenop. Insects in coll. Brit. Mus., 6 : 105. *Type species* : *Formica carssinoda*, Emeri 1901, Ann. Soc. Ent. Belgique, 45 : 42.

1861. *Leptogenys* Roger, Berl. Ent. Zeitsch., 5 : 41. *Type species* : *Leptogenys falcigera* Roger, 1861, from Sri Lanka.

96. *Leptogenys chinensis* Mayr

1870. *Lobopelta chinensis* Mayr, Verh. Zoo-Bot. Ges. Wien, 20 : 965.

1900. *Leptogenys chinensis* Forel, J. Bom. Nat. Hist. Soc., 13 : 313.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Except in the drier parts.

Elsewhere : China, Japan.

97. *Leptogenys dentilobis* Forel

1900. *Leptogenys dentilobis* Forel, J. Bom. Nat. Hist. Soc., 13 : 305.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Karnataka, Kerala, Maharashtra and Tamilnadu.

98. *Leptogenys kitteli* Mayr

1870. *Lobopelta kitteli* Mayr, Verh. Zoo-Bot. Ges. Wien, 20 : 966.

1895. *Leptogenys kitteli*, Emery, Ann. Mus. Civ. Sto. Nat. Genova., 14 : 461.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Southern and Western India.

99. *Leptogenys processionalis* Jerdon

1851. *Ponera processionalis* Jerdon, Mad. J. Lit. Sci., 17 : 118.

1911. *Leptogenys processionalis*, Emery, Gen. Ins., 118 : 105.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Whole of peninsular India.

100. *Leptogenys* sp. 1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

35. Genus *Pachycondyla* Smith

1858. *Pachycondyla* Smith, Catalogue of Hymenop. Insects in coll. of Brit. Mus., 6 : 105. *Types species* : *Formica Crassinoda*, Emery 1901, Ann. soc. Ent. belgique, 45 : 42.

101. *Pachycondyla annamita* André

1892. *Ponera annamita* André, Rev. Ent., 11 : 48.

1893. *Bothroponera annamita*, Dalla Torre, Cat. Hym., 7 : 35.

1900. *Ectomomyrmex annamita* Forel, J. Bom. Nat. Hist. Soc., 13 : 322.

1901. *Pachycondyla annamita*, Emery, Ann. Soc. Ent. Belg., 45 : 46.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : South India.

Elsewhere : Myanmar.

102. *Pachycondyla leeuwenhoeki* (Forel)

1886. *Ponera leeuwenhoeki* Forel, J. Asi. Soc. Bengal, 55 : 244.

1891. *Bothroponera leeuwenhoeki* Forel, Hist. Nat. Hym., 2 : 124.

1900. *Ectomomyrmex leeuwenhoeki* Forel, J. Bom. Nat. Hist. Soc., 13 : 321.

1901. *Pachycondyla leeuwenhoeki*, Emery, Ann. Soc. Ent. Belg., 45 : 46.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Southern India, Assam.

Elsewhere : Myanmar.

103. *Pachycondyla rufipes* (Jerdon)

1851. *Ponera rufipes* Jerdon, Mad. J. Lit. Sci., 17 : 119.

1858. *Pachycondyla rufipes*, Smith, F. Cat. Hym., 6 : 106.

Material examined : Southern India: Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Almost throughout India.

Elsewhere : Myanmar.

104. *Pachycondyla sulcata* (Mayr)

1867. *Ponera sulcata* Mayr, Verh. Zoo-Bot. Geis. Wien, 17 : 441.

1891. *Bothroponera sulcata*, Forel, Hist. Nat. Hym., 2 : 124.

1901. *Pachycondyla sulcata*, Emery, Ann. Soc. Ent. Belg., 45 : 46.

Material examined : Southern India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Almost throughout India.

105. *Pachycondyla tesseronoda* (Emery)

1877. *Ponera tesseronoda* Emery, Ann. Mus. Civ. Sto. Nat. Genova, 9 : 368.

1891. *Bothroponera tesserinoda* Forel, Les Formidae, 20 : 124.

1901. *Pachycondyla tesseronoda* Emery Ann. Soc. Ent. Belgique, 45 : 46.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : South India, Uttar Pradesh.

Elsewhere : Sri Lanka and Myanmar.

106. *Pachycondyla* sp.1

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

VII. Subfamily PSEUDOMYRMICINAE

36. Genus *Tetraponera* Smith

1852. *Tetraponera* Smith, Ann. Mag. Nat. Hist., (2)9 : 44. *Types species* : *Tetraponera atrata*, by subsequent designation of Wheeler, 1911.

107. *Tetraponera allaborans* (Walker)

1859. *Pseudomyrma allaborans* Walker, *Ann. Mag. Nat. Hist.*, **4** : 375.

1877. *Tetraponera allaborans* Smith, F., *Trans. Ent. Soc. Lond.*, **10** : 69.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. Ketha Gowda.

Distribution : Western and Southern India, West Bengal.

Elsewhere : Australia, China, Myanmar and Srilanka.

108. *Tetraponera nigra fergusoni* (Forel)

1902. *Sima nigra, r. fergusoni* Forel, *Rev. Suisse, Zool.*, **10** : 248.

1903. *Sima fergusoni*, Bingham, *Fauna Brit. India, Hymenoptera*, **2** : 114.

1921. *Tetraponera nigra r. fergusoni* Emery, *Fasc.*, **174A** : 26.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Kerala.

Elsewhere : Lower Myanmar, Pakistan and Thailand.

109. *Tetraponera rufonigra* (Jerdon)

1851. *Ecton rufonigrum* Jerdon, *Madras J. Lit. Soc.*, **17** : 111.

1877. *Tetraponera rufonigra* Smith, *Trans. Ent. Soc. Lond.*, (4) **10** : 68.

Material examined : South India : Karnataka : BRTWLS, 1999, coll. DRP.

Distribution : Widely distributed species in India.

Elsewhere : Pakistan, Myanmar, Sri Lanka, Singapore, Indonesia and China.

REFERENCES

BINGHAM, C. T. 1903. *The Fauna of British India, including Ceylon and Burma. Hymenoptera* -Vol. II Ants and Cuckoo-wasps : 1-506.

BOLTON, B. 1994. *Identification guide to the ant genera of the world*. Harvard University Press, Cambridge, Massachusetts.

BOLTON, B. 1995. *A new general catalogue of the ants of the world*. Harvard University Press, Cambridge, Massachusetts.

FOREL, A. 1900. Les Formicides de l'empire des Indes et al. Ceylon., *J. Bombay nat. Hist. Soc.*, **13** : 52-65.

INSECTA : HYMENOPTERA (APOCRITA)

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INTRODUCTION

The present account is based on a small collection of Hymenoptera (Apocrita) obtained from the Biligiri Rangaswamy Temple Wildlife Sanctuary, which is an important conservation area in Karnataka. Terminology and classification of the order Hymenoptera by Gould & Huber (1993) is followed here.

Among the pioneering works on the Hymenoptera of India and adjacent countries, the work of Bingham (1897, 1903) and Morley, 1913 are noteworthy. Subsequently, several comprehensive systematic studies were made on various families of Hymenoptera of the country by Das & Gupta, 1989 (Vespidae), Bohart & Menke, 1976 (Sphecidae), Jonathan & Gupta, 1999 (Scoliidae), Batra, 1977 (Apidae), Bolton, 1977 (Formicidae), Gupta, 1987 (Ichneumonidae) and Subba Rao & Hayat, 1986 (Chalcidoidea).

SYSTEMATIC ACCOUNT

Order HYMENOPTERA

Suborder APOCRITA (Aculeata)

Superfamily APOIDEA (Apiformes)

Family APIDAE

Subfamily APINAE

Tribe Apini

1. *Apis (Micrapis) florea* Fabricius

1787. *Apis florea* Fabricius. Mant. Ins., 1 : 305.

1904. *Apis (Micrapis) florea* : Ashmead, Proc. Ent. Soc. Wash., 6 : 122.

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Diagnostic characters : Size small, 6-8 mm; colour black; the basal two or three-gastral tergites reddish brown; head, thorax and gaster dull and opaque, very minutely aciculate, pubescent, pubescence on head and thorax white, meta tibia and dorso-lateral margin of meta basitarsus with white setae; wings hyaline and slightly iridescent, forewing length 6-7 mm, distal abscissa of median vein of hind wing absent.

Material examined : 4 ♀ ♀ (workers), Banuwadi, 19.ii.1998; 1 ♀ (worker), c_1050 mts. 1.iii.1999, 25 ♀ ♀ (workers), Hanakere (3400 ft.), 27.ii.1999, coll. S. Krishnan & party.

Distribution : India.

Elsewhere : Sri Lanka, Myanmar extending in the Malayan region as far as Indonesia.

Remarks : This is the smallest among the honeybees and commonly known as the red dwarf honeybee.

2. *Apis (Apis) cerana indica* Fabricius

1798. *Apis indica* Fabricius. *Ent.Syst. (Suppl.)*, 274.

Diagnostic characters : Size moderate, 11-12 mm; head thorax and gaster smooth and shining, sparsely pubescent, sometimes densely so; head thorax and apical gastral tergites black, scutellum and basal five tergites of gaster yellow brown, legs rufo-fuscous, wings hyaline, forewing length 7-9 mm, distal abscissa of median vein of hind wing present.

Material examined : 4 ♀ ♀ (worker), C_1050 mts, 1.iii.1999; 2 ♀ ♀, Budipadaka, 18.ii.1999, 1 ♀ (worker), Hanakere, Alt. 3400 ft, 27.ii.1999, coll. S. Krishnan.

Distribution : Throughout India.

Elsewhere : Myanmar, Sri Lanka, extending through the Malaysia on the east and the Madagascar on the west.

Remarks : This is the species most often kept in apiaries and commonly called the plains bee.

3. *Apis (Megapis) dorsata* Fabricius

1793. *Apis dorsata* Fabricius. *Ent. Syst., 2* : 328.

1904. *Apis (Megapis) dorsata* : Ashmead. *Proc. Ent. Soc. Wash.* 6 : 120.

Diagnostic characters : Size large, 16-18 mm; head thorax and gaster pubescent, more or less sparse or dense; head and mesonotum finely punctured under the pubescence, a short medial, vertical groove below the anterior ocellus; head, thorax, legs and apical three segments of gaster black, more or less pale and fuscous on the hind part of thorax and basal tree tergites of gaster honey yellow; forewing fuscous, length 12-15 mm, distal abscissa of median vein of hind wing present.

Material examined : 1♀, c_1050 mts, 1.iii.1999, 3♀♀, Bhanuwadi, 19.ii.1999, coll. S. Krishnan.

Distribution : Throughout India.

Elsewhere : Sri Lanka, Myanmar, China, Malaysia, and Java.

Remarks : Commonly called the giant honeybee due to the large body size, builds nests most often on high trees and produce maximum honey and wax.

Key to the *Apis* species of Biligiri Rangaswamy Temple Sanctuary

1. Worker size small, 6-8mm; forewing length 6-7mm; distal abscissa of median vein of hind wing absent; basal 2 or 3 gastral tergites reddish brown; head and thorax dull, opaque *Apis (Micrapis) florea* Fabricius
- Worker size moderate to large, 8-16mm; forewing length 7-15mm; distal abscissa of median vein of hind wing present; colour of gastral tergites, head and thorax different 2
2. Forewing hyaline; scutellum yellowish brown, rarely black; worker size moderate, 11-12mm; forewing length 7-9mm *Apis (Apis) cerana indica* Fabricius
- Forewing fuscous, scutellum black, worker size large, 16-18mm, forewing length 12-15mm *Apis (Megapis) dorsata* Fabricius

Family ANTHOPHORIDAE

Subfamily XYLOCOPINAE

4. *Xylocopa latipes* (Drury)

1770. *Apis latipes* Drury. *III. Exot. Ins. ii.*

1938. *Xylocopa latipes* (Drury) Maa. *Rec. Indian Mus.*, **40** : 325-327.

Diagnostic characters : Size 30 mm and above; black in colour, with black pubescence thick and velvety on the mesonotum anteriorly and long and tufted on the lateral margins of the gastral segments, pubescence on posterior tibiae long, dense and stiff; wings dark fuscous with vivid coppery green and purple iridescence changing as they catch light; scape of antennae distinctly flattened and broad at apex; head thorax and gaster punctured, the clypeus, mesonotum anteriorly and gaster most densely so; face with two deep sulcations from below the base of the antennae to beyond the posterior ocelli; the division between forming a marked ridge and widening above to receive the anterior ocellus.

Material examined : 1♀, Basavana road, Alt. 900 mt. 3.iv.1999, coll. G. Thirumalai.

Distribution : India.

Elsewhere : Myanmar, China, and Malaysia.

Remarks : Commonest of the carpenter bees making loud buzzing sound.

Superfamily APOIDEA (Spheciformes)

Family SPHECIDAE

Subfamily SPHECINAE

Tribe Sceliphronini

5. *Sceliphron (Sceliphron) madraspatanaum madraspatanum* (Fabricius)

1781. *Sphex madraspatanus* Fabricius. *Ent. Syst.*, 2 : 204.
 1852. *Pelopaeus bilineatus* Smith. *Ann. Mag. Nat. Hist.*, (2)9 : 47.
 1852. *Pelopaeus separatus* Smith. *Ann. Mag. Nat. Hist.*, (2)9 : 47.
 1897. *Sceliphron (Sceliphron) madraspatanaum madraspatanum* (Fabricius) : Bingham, *Fauna of British India*, I : 237.

Diagnostic characters : Color black, a line on the pronotum, tegulae, post-scutellum, apices of femora and tibiae of fore and middle legs, trochanters, base of femora and tibiae of hind legs and petiole yellow; wings hyaline with brownish tint; head finely and closely punctate; pronotum in front, mesoscutum and popodeum transversely striated, scutellum and postscutellum longitudinally striated; propodeum with the enclosed portion at base raised and also with a broad median longitudinal shallow groove; petiole and gaster largely smooth and shiny.

Material examined : 1♂, Biligiri Rangaswamy Hills, c. 1.iii.1999, coll. S. Krishnan.

Distribution : Throughout India.

Elsewhere : Myanmar, Indonesia, Malaysia, Maldives, Vietnam, and Sri Lanka.

Remarks : This is one of the common and widely distributed species in India and adjacent countries and is readily distinguished by the yellow bands on legs.

Superfamily CHRYSIDOIDEA

Family CHRYSIDIDAE

Subfamily CHYSIDINAE

6. *Stilbum cyanurum splendidum* Forster

1771. *Chrysis cyanurum*. *Nov. Spec. Ins.*, 89.
 1775. *Chrysis amethystina* Fabricius *Syst. Ent.*, 359.

1806. *Stilbum splendidum splendidum* Spinola. *Ins. Lig.*, I : 9.

1903. *Stilbum cyanurum splendidum* Forster. *Bingham : Fauna Brit. India*, II : 433.

Diagnostic characters : Metallic bluish green in colour, third gastral tergite purple, occiput, median area of mesonotum, first and second gastral tergites metallic blue; head and thorax densely and coarsely punctate, the sides of head and cheeks elongate, the mandible produced in the shape of a beak; antennae moderately long and thick, anterior ocellus placed in a hollow; post scutellum, projects backwards; wings fusco-hyaline, hindwing without closed cells; gaster massive, sides of first and second tergites at base laterally flattened; apical margin of gaster with 4 subequal large triangular teeth, the medial two slightly advanced and closer to each other.

Material examined : 1 ♀, Kenkere, Alt. 3000 ft. 25.ii.1999, coll. S. Krishnan.

Distribution : Throughout India.

Remarks : Commonly called the cuckoo wasp.

Superfamily VESPOIDEA

Family VESPIDAE

Subfamily POLISTINAE

Tribe Ropalidini

7. *Ropalidia (Anthreneida) variegata variegata* (Smith)

1852. *Epipone variegata* Smith. *Ann. Mag. Nat. Hist.*, (2)9 : 48.

1989. *Ropalidia (Anthreneida) variegata variegata* Das & Gupta. *Oriental Ins. Monogr.*, 11 : 144.

Diagnostic characters : Ferruginous brown, the clypeus, a spot between the base of the antennae, the inner orbits, a line behind eye, anterior and posterior margins of prothorax, the tegulae, scutellum anteriorly, the post scutellum, two larger oval marks on the propodeum posteriorly, a spot beneath the base of each wing, the posterior margin of the petiole and the first gastral tergite and a larger spot on each side of the base of the latter, yellow; legs ferruginous, variegated with yellow; wings hyaline with a small subapical cloud on the forewing; petiole of the gaster swollen and globular above near apex.

Material examined : 1 ♀, Budipadaka, 18.ii.1999, coll. S. Krishnan.

Distribution : India (W. Bengal, Bihar, Delhi, Gujarat, Karnataka, Maharashtra, Madhya Pradesh, Punjab, Tamil Nadu, Uttar Pradesh).

Elsewhere : China, Nepal and Pakistan.

Suborder APOCRITA (Parasitica)
 Superfamily CHALCIDOIDEA
 Family PTEROMALIDAE
 Subfamily PTEROMALINAE
 Tribe Pteromalini

8. *Kumarella angulus* Sureshan

1999. *Kumarella angulus* Sureshan. *Oriental Ins.*, 32 : 100-101.

Diagnostic characters : Size very small, 3.9-4 mm, head and thorax dark metallic blue; gaster brown; toruli above lower margin of eyes, scape reaching median ocellus, pedicel as long as second funicular segment; propodeum with median area in the form of four depressed areas; forewing with marginal vein 1.4x postmarginal; gaster 1.3x as long as head plus thorax.

Material examined : 1 ♀, Bhanuwadi, 19.ii.1999. coll. S. Krishnan.

Distribution : India : Kerala, Karnataka.

Remarks : This is the first record of the species from Karnataka and the subsequent report after the original description.

Family TORYMIDAE
 Subfamily MONODONTOMERINAE
 Tribe Monodontomerini

9. *Torymoides kiesenwetteri* (Mayr)

1874. *Holaspis kiesenwetteri* Mayr. *Verh. Zool. bot. Ges. Wien.*, 31.

1994. *Torymoides kiesenwetteri* (Mayr). Narendran. *Univ. of Calicut. Zool. Monograph*, : 45.

Diagnostic characters : Size very small, 3-4 mm; bright metallic green in colour; wings hyaline; antennae inserted little below middle of face, first funicle segment anelliform and as wide as the other segments; thorax rugulose with small sparse pubescence; scutellum overlaps metanotum; propodeum narrow medially with a line of transverse punctures close to metanotum; gaster with ovipositor exerted out, length 3.12x as long as hind tibia.

Material examined : 1 ♀, Bhanuwadi, 19.ii.1999, coll. S. Krishnan.

Distribution : India (Kerala, W. Bengal, Tamil Nadu).

Elsewhere : Nepal, Europe.

Remarks : In India, the species is known from galls of the tephritid fly *Procecidochares utilis* Stone on *Eupatorium adenophorum* and *E. glandulosum*.

SUMMARY

The present study records 9 species of Hymenoptera (Apocrita) belonging to 9 genera under 4 superfamilies and 7 families from the Biligiri Rangaswamy Temple Sanctuary, Karnataka. All the species are reported for the first time from the area. Though most of the species reported here are common, the record of *Kumarella angulus* Sureshan (Chalcidoidea: Pteromalidae) is interesting. It occurs in the dry deciduous forests and is so far known only from Palakkad and Malappuram districts of Kerala.

REFERENCES

- BATRA, S.W.T. 1977. Bees of India, Apoidea, their behaviors, management and a key to the genera. *Oriental Ins.*, 11(3) : 289-323.
- BINGHAM, C.T. 1897. *The fauna of British India including Ceylon and Burma. Hymenoptera. Wasps and Bees I.* Taylor & Francis London. 1-579.
- BINGHAM, C.T. 1903. *The fauna of British India including Ceylon and Burma. Ants and Cuckoo wasps II.* Taylor & Francis, : 1- 506.
- BOHART, R.M. and A.S.MENKE. 1976. Sphecid wasps of the world (a generic revision) University of California press, California, : 1-695.
- BOLTON, B. 1977. The ant tribe Tetramorini (Hymenoptera : Formicidae) The genus *Tetramorium* Mayr. In the Oriental and Indo-Australian regions and in Australia. *Bull. Br. Mus. Nat. Hist. (Ent.)*, 36(2) : 67-151.
- DAS, B.P. & GUPTA, V.K. 1989. The social wasps of India and the adjacent countries (Hymenoptera : Vespidae). *Oriental Ins. Monogr.*, 11 : 1- 292.
- GOULET, H. & HUBER, J.T. 1993. Hymenoptera of the world. An identification guide to families. Agriculture Canada, : 1-668.
- GUPTA, V.K. 1987. Catalogue of the Indo-Australian Ichneumonidae. part. I & II. *Mem. Amer. Ent. Inst.*, 41 : 1-1210.
- JONATHAN, J.K. & GUPTA, S.K. 1999. Fauna of West Bengal (part 8). Hymenoptera : Scoliidae. *Zool. Surv. India*, Kolkata, 185-210.
- Morley. 1913. *The fauna of British India including Ceylon and Burma. Ichneumonidae. Hymenoptera. III.* Taylor & Francis London, : 1-531.
- SUBBA RAO, B.R. & M.HAYAT, (Eds) 1986. The Chalcidoidea (Insecta : Hymenoptera) of India and the adjacent countries part II. A catalogue. *Oriental Ins.*, 20 : 1-430.

SCORPION

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INTRODUCTION

From the Biligiri Rangasamy Temple Wildlife Sanctuary, some interesting scorpion species collected at an altitude of 1100 m and above are detailed here. The scorpion samples were collected from seven localities covered in 3 surveys during the years 1999-2000, by the scientists of Southern Regional Station, Zoological Survey of India, Chennai. The 59 examples collected and studied belong to 4 species under 3 families. Since there is no comprehensive account of scorpion fauna of Biligiri Rangaswamy Temple Wildlife Sanctuary, this forms the first authentic report. Identification and classification follows that given in Pocock (1900) and Tikader & Bastwade (1983).

SYSTEMATIC LIST

Order SCORPIONS

Family BUTHIDAE

Subfamily BUTHINAE

1. *Lychas (Endotrichus) tricarinatus* Simon-1 ex.

Subfamily CENTRURINAE

2. *Isometrus (Closotrichus) sankeriensis* Tikader and Bastawade-2 exs.

Family ISCHNURIDAE

3. *Iomachus laeviceps malabarensis* Pocock-1 ex.

Family SCORPIONIDAE

4. *Heterometrus (Chersonesometrus) kanaraensis* (Pocock)-55 exs.

SYSTEMATIC ACCOUNT

Order SCORPIONS

Family BUTHIDAE

Subfamily BUTHINAE

1. *Lychas (Endotrichus) tricarinatus* Simon

1844. *Lychas tricarinatus* Simon, Ann. Mus. Civ. Sto. nn. Genova, 20 : 371.

1983. *Lychas (Endotrichus) tricarinatus* Tikader & Bastawade, Fauna of India : Scorpions, Scorpionida : Arachnida, III : 71.

Material examined : 1 ex., Road to Podithagadu., 1100 m 5.iv.99., Coll. G. Thirumalai.

Diagnostic Characters : III & IV pair of legs always furnished with a tibial spur, Carapace with posterior median or lateral carinae. Vesicle elongated and provided with strong triangular subaculear spine. Lateral carinae on mesosomal tergites granular and well developed on posterior portion.

Distribution : Thanjavur, Yercaud in Shevaroy Hills, Chengelput, Salem, Dharmapuri, Kanyakumari Districts, Niligiri Biosphere Reserve, Anamalai Wildlife Sanctuary, Tamil Nadu; Belgaum, Mangalore, Kanara, Kodagu, Karnataka; Trivandrum, Kerala; Nellore, Andhra Pradesh; Bhopal, Madhya Pradesh.

Remarks : This species inhabits both plains and hilly regions and exhibits sexual dimorphism. Metasoma is thin and long in male and thick and short in female. One of the most common species of Southern India. New report for Biligiri Rangaswamy Temple Wildlife Sanctuary.

Subfamily CENTRURINAE

2. *Isometrus (Closotrichus) sankeriensis* Tikader and Bastawade

1983. *Isometrus (Closotrichus) sankeriensis* Tikader & Bastawade, The fauna of India, Scorpions, Scorpionida : Arachnida, III : 311-316.

Material examined : 2 exs., Parathukatte to Bodipaduga., 28.xi.2000, Coll. G. Thirumalai.

Diagnostic Characters : III & IV pair of legs without tibial spur. Trichobothiria db is placed distal to et 1, vesicle more bulbous.

Distribution : India : Karwar, Karnataka; Silent Valley, Kerala. New report for this Wildlife Sanctuary.

Remarks : Usually occurs in high altitudes. Endemic to Peninsular India.

Family ISCHNURIDAE

3. *Iomachus laeviceps malabarensis* Pocock

1900. *Iomachus laeviceps malabarensis* Pocock, Fauna Brit. India Arachn., : 82

Material examined : 1 ex., Parashukatta to Budipaduga, 28.xi.2000, Coll. G. Thirumalai.

Diagnostic Characters : Carapace, mesosoma and pedipalp flat and depressed tarsomere II furnished on ventral surface with few delicate spinules on sides. Carina in patella of pedipalp smooth and obsolete; the trichobothria on patella in the group eb placed more closer.

Distribution : India : Mangalore, Karnataka; Anamalai, Tamil Nadu.

Remarks : Endemic to southern India. Common at higher altitudes. New report for this Wildlife Sanctuary.

Family SCORPIONIDAE

4. *Heterometrus (Chersonesometrus) kanaraensis* (Pocock)

1900. *Palamnaeus scaber kanaraensis*, Pocock, Fauna British India, Arachn., : 93.

1978. *Heterometrus (Chersonesometrus) kanaraensis* : Couzijn, Symp. Zool. Soc. Lond., 42 : 327.

Material examined : 1 ex., Road to Podithagadu, Alt. 1100 m, 5.iv.99, G. Thirumalai; 4 exs., Road to Sebinakare, 05.iv.99, G. Thirumalai, 24 exs., Sebinakare to Dorasanialla, Alt., 1140 mts, 27.ii.2000, G. Thirumalai, 18 exs., Biligiri Rangaswamy Temple Wildlife Sanctuary Hills, 900 m, 29.ii.2000, G. Thirumalai, 8 exs., Doddasempige, 1000 mts., 2.iii.2000, G. Thirumalai.

Diagnostic Characters : Carapace smooth without carinae and anterior margin deeply incised. Superciliary crest pressed Rostrolateral margin entire without incision next to posterior lateral eyes. Pectinal teeth not more than 13/13 in number. Vesicle as long as II caudal segment. Angle between Dt., Et 5 & Et 4 more than 90°

Distribution : India : Kanara (type locality), Karnataka; Bombay, Maharashtra.

Remarks : Endemic to Karnataka. New report for Biligiri Rangaswamy Temple Wildlife Sanctuary.

SUMMARY

There is no earlier published record of the scorpion fauna of Biligiri Rangaswamy Temple Wildlife Sanctuary. The present collection comprises 4 species which are new records to the area of study. Of these the dominant species encountered in 5 localities is

Heterometrus (Chersonesometrus) kanaraensis which formed about 93% (55 exs.) of the specimens collected and studied. Interestingly this species is endemic to Karnataka State.

REFERENCES

- POCOCK, R.I. 1900. *Fauna of British India, Arachnida*, London : 1-279.
- TIKADER, B.K. and BASTAWADE, D.B., 1983. *Fauna of India : Scorpions, Scorpionida, Arachnida*, Vol. III : 1-671.

ARANEAE : ARACHNIDA (SPIDERS)

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INTRODUCTION

This account deals with a small collection of spiders collected from Biligiri Rangaswamy Temple Wildlife Sanctuary, Karnataka, which comprises 7 species accommodated under 6 families. The female specimen belonging to the family Theraphosidae seems to be interesting and requires more specimens of both the sexes to be studied for further confirmation of the generic and species status. The dried up and immature specimens could not be studied upto species level but assigned upto the generic taxa. All the species are reported for the first time from Biligiri Rangaswamy Temple Wildlife Sanctuary.

SYSTEMATIC ACCOUNT

Class ARACHNIDA

Order ARANEAE

Family LYCOSIDAE (Wolf Spiders)

1. *Hippasa lycosina* Pocock

2. *Lycosa mahabaleshwarensis* Tikader and Malhotra

Family HETEROPODIDAE (Giant Crab Spider)

3. *Heteropoda (= Sparassus) nilgirina* Pocock

Family PISAURIDAE (Nursery web Spiders)

4. *Pisaurius* sp.

Family OXYOPIDAE (Lynx Spiders)

5. *Oxyopus* sp.

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Family THERAPHOSIDAE
Subfamily ISCHNOCOLINAE

6. *Plesiophrictus* sp.

Family TETRAGNATHIDAE

7. *Tetragnatha mandibulata*, Walckenaer.

Key to the Families

1. Chelicerae diaxial i. e. projecting downwards, fang articulation in vertical plane, move in more or less transverse plane and not closing backward. Usually with one pair of book lungs Suborder LABIDOGNATHUS.....2
- Chelicerae paraxial i. e. projecting horizontally, fang articulation in vertical plane, move in more or less s With two pairs of book lungs
..... Sub-order ORTHOGNATHA (Family THERAPHOSIDAE)
2. Tarsi with two claws and with claw tufts, legs, at least, first two pairs, laterigrade (Crab like), carapace normally wider than long, not much narrowed in front, apex of metatarsus of legs provided with soft trilobate membrane. Lower margin of cheliceral fang distinct and armed with teeth
..... Family SPARASSIDAE (= HETEROPODIDAE)
- Tarsi with three claws but without claw tufts, legs prograde, carapace longer than wide and mostly narrowed in front. Apex of metatarsus of legs not soft and also not provided with trilobate membrane. Lower margin of cheliceral fang normally with smooth furrow or with few delicate teeth 3
3. Eight eyes grouped in hexagonal, anterior row recurved and the posterior strongly procurved, clypeus high, abdomen tapering and more acutely pointed, all legs with long and conspicuously spined Family OXYOPIDAE
- Eight eyes not grouped in hexagonal, clypeus lower, abdomen not much tapering and not acutely pointed, leg may or may not be long and spined 4
4. Tarsi of legs with numerous trichobothria and trochanters with a curved notch, chelicerae with short fang and furrow armed with few teeth, thoracic area of cephalothorax raised and posterior row of eyes recurved 5
- Tarsi of legs with out trichobothria and trochanter with out curved notch, chelicerae mostly with long fang and basal segment, both armed with many stout teeth, posterior eyes lie almost in straight line, thoracic area of cephalothorax flat and not much raised Family TETRAGNATHIDAE
5. Posterior row of eyes strongly recurved (appear as in two rows). Median claw of legs smooth or single tooth, anterior piece of lorum rounded behind and fitting into the

notch of posterior piece. Egg-sac carried attached with spinnerets and youngs carried on mothers back Family LYCOSIDAE

Posterior row of eyes not forming two distinct rows but only slightly recurved. Median claw with two or three teeth. Anterior piece of lorum with a notch into which the posterior piece fits. Egg-sac held underneath of cephalothorax. Youngs not carried by mother Family PISAURIDAE

Class ARACHNIDA

Order ARANAEAE

Family LYCOSIDAE (Wolf Spiders)

1. *Hippasa lycosina* Pocock

1900. *Hippasa lycosina* Pocock, Fauna. Brit. India, Arach., : 250

Diagnostic characters : Posterior spinnerets distinctly longer than the anterior, anterior row of eyes little wider than the second row, sternum with mid-longitudinal dark marking. Pit of vulva arch shaped anteriorly, arch of vulva pointed mid-anteriorly and abdomen without any antero-mid dorsal lens shaped marking.

Material examined : 1 ex. from Sebinakare to Dorasanialla, Biligiri Rangaswamy Temple Wildlife Sanctuary, 27.xi.2000, Coll. G. Thirumalai.

Distribution : Attakatti, Kerala; Kanara, Karnataka; Bombay, Nasik, Poona, Satara, Maharashtra; Nilgiris, Pykara, Tamil Nadu; Dehra Dun, Mussoorie, Uttaranchal.

Habitat : Build sheet webs with a silken funnel retreat in short grass such as lawns and mown grassy banks in formal parks.

Remarks : This is the first record from Biligiri Rangaswamy Temple Wildlife Sanctuary.

2. *Lycosa mahabaleshwarensis* Tikader & Malhotra

1980. *Lycosa mahabaleshwarensis* Tikader and Malhotra, Fauna of India, Spiders (Lycosidae), 1(2) : 249-448.

Diagnostic characters : Anterior row of eyes straight or slightly procurved. Anterior median eyes never smaller than the anterior laterals, sternum mid-longitudinally provided with a conspicuous broad black band. Tibiae I and II uniform black ventrally and tibiae III & IV with dark brown, broad bands only at the ventral extremities.

Material examined : 1 ex. from Sebinakare to Dorasanialla, Biligiri Rangaswamy Temple Wildlife Sanctuary, 27.xi.2000, Coll. G. Thirumalai.

Distribution : Karnataka, Maharashtra.

Habitat : Lives in a burrow in the ground and the entrance are covered by a thin sheet of silk when the spider is present.

Remarks : It is a common ground spider.

Family SPARASSIDAE (= HETEROPODIDAE)(Giant Crab Spider)

3. *Heteropoda nilgirina* Pocock

1901. *Heteropoda nilgirina* Pocock, J. Bombay Nat. Hist. Soc., 13 : 495.

Diagnostic characters : Abdomen oval with a dark brown horizontal marking and other patches present on the dorsum; median piece of epigynum wider at its proximal end and narrow distally; lateral lobes divergent anteriorly.

Material examined : 1ex. from Sebinakare to Dorasanialla, Biligiri Rangaswamy Temple Wildlife Sanctuary, 27.xi.2000, Coll. G. Thirumalai.

Distribution : Coonoor, Fatagiri, Kotagiri, Ootacamund, Tamil Nadu; Chakrata, Dehra Dun, Garhwal, Sahranpur, Uttaranchal.

Habitat : Walking about on floors, ceilings and walls of houses, silken retreats; in cracks, under bark or webbery on tree trunks.

Remarks : Widely spread throughout the tropics and subtropics worldwide.

Family PISAURIDAE (Nursery web Spiders)

**4. *Pisaurus* sp.
(The nursery-web spiders)**

1885. *Pisaura* Simon, Ann. Soc. Ent. Fr., 5(6) : 345-396.

Diagnostic characters : Posterior row of eyes not forming two distinct rows but only slightly recurved. Median claw with two or three teeth. Anterior piece of lorium with a notch into which the posterior piece fits. Eggsac held under cephalothorax, young not carried by mother.

Material examined : 1ex. from Sebinakare to Dorasanialla, Biligiri Rangaswamy Temple Wildlife Sanctuary, 27.xi.2000, Coll. G. Thirumalai.

Distribution : Pisaura is widespread in Africa and Palaearctic region.

Habitat : Found in open areas of grass and dwarf shrubs, along the edges of streams and ponds.

Remarks : This is a family of wandering spiders and not a strict waterside Pisaurid. No generic and species key available.

Family OXYOPIDAE (Lynx Spiders)

5. *Oxyopes* sp.
(*Lynx spiders*)

1804. *Oxyopes* Latreille, *Hist. Nat. Arach. France*, 14(7) : 144

Diagnostic characters : Posterior row of eyes strongly procurved and equidistant from each other. Ocular quadrangle longer than wide and limited by the posterior median eyes and the anterior lateral eyes. The characteristic cephalothorax and the extremely spiny legs enable one to identify Oxyopids in the field.

Material examined : 2ex. from Sebinakare to Dorasanialla, Biligiri Rangaswamy Temple Wildlife Sanctuary, 27.xi.2000, Coll : G. Thirumalai.

Distribution : Africa, America, Asia, Australia and Europe (worldwide, from the tropics to the temperate).

Habitat : Free ranging over plants or grasses; no webs, rarely at the top or surface of plants.

Remarks : Collections dried up.

Family THERAPHOSIDAE

Subfamily ISCHNOCOLINAE

6. *Plesiophrictus* sp.

1899. *Plesiophrictus* Pocock. *J. Bombay. nat. Hist. Soc.*, : 749

Diagnostic characters : No stridulating organ is present between the chelicera and the maxillae or the maxillae and the coxa of leg 1. No peg like setae are present between the two chelicerae. Tarsal scapulae of legs 3,4 divided by a line of setae. Cymbium of the male palpal bulb has a distinct sigmoid depression. Twin tibial spur present -made up of a primary and secondary segment.

Material examined : 1ex from Sebinakare to Dorasanialla, Biligiri Rangaswamy Temple Wildlife Sanctuary, 27.xi.2000, Coll. G. Thirumalai.

Distribution : Matheran, Mumbai, Uran, Maharashtra. This genus is widespread throughout India and Srilanka.

Habitat : Silken retreats in crack in the ground under bark, logs or stones webbery on tree trunks.

Remarks : Some more collection needed.

Family TETRAGNATHIDAE

7. *Tetragnatha mandibulata* Walckenaer

1837. *Tetragnatha mandibulata* Walckenaer, Ins. Apt., 2 : 211.

Diagnostic characters : At once recognised by its thin elongated body and robust chelicerae with powerful fangs and denticulated on inner margins of basal segment. Abdomen elongated, decorated with silvery reticulated on dorsal surface. Female epigyne simple tubular type while males with much elongated male palp provided with bulbous apparatus ending in pointed terminal apophysis.

Material examined : 1 ex. from Sebinakare to Dorasanialla, Biligiri Rangaswamy Temple Wildlife Sanctuary, 27.xi.2000, Coll. G. Thirumalai.

Distribution : Andaman Islands, Assam, Bihar, Karnataka, Kerala, Maharashtra, Orissa, Sikkim, Tamil Nadu, West Bengal, India.

Elsewhere : Burma, Nepal.

Habitat : Generally seen in tall grasses along wetlands waiting patiently on regular snares for prey.

Remarks : Common species around wetlands.

SUMMARY

The spider fauna of India belongs to 43 families and they are known to occur in all possible habitats. But the present collection form Biligiri Rangaswamy Temple Wildlife Sanctuary represents only 6 families. Therefore, more surveys are required in the sanctuary to assess its spider faunal diversity.

REFERENCES

- ANDREW SMITH and PETER KIRK. 2002. A field guide on the Theraphosid spiders of India and Sri Lanka – particularly of the genus *Poecilotheria*.
- FRANCES and JOHN MURPHY. 2000. An Introduction to the spiders of South East Asia.
- GAJBE, U. A. 1999. Studies on some spiders of the Family Oxyopidae (Araneae: Arachnida) from India, *Rec. zool. Surv. India*, 99(3) : 31-79.
- SETHI, V.D. and TIKADER, B.K. 1988. Studies on some Giant spiders of the Family Heteropodidae from India. *Rec. zool. Surv. India, Occ. Pap. No., 93* : 1-94.
- TIKADER, B.K. and MALHOTRA, M.S. 1980. *Fauna of India Spider (Lycosidae)*, 1(2) : 249-448.
- TIKADER, B.K. 1987. *Handbook of Indian Spiders*, : 1-245.

PISCES

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INTRODUCTION

Fish samples (1901 exs.) collected by the scientists of Southern Regional Station, Zoological Survey of India, Chennai, from 18 localities in five survey spells during the year 1999 and 2000 have been studied and were identified as belonging to 25 species under 9 families and 3 orders. A systematic account of the fauna is provided following Day (1875-78), Jayaram (1999), Menon (1999) and Talwar and Jhingran (1991). The study extends the range of distribution of three noemacheilids.

Key to orders

1. No spines in dorsal and anal fins. Lateral line chiefly on head, not on body. CYPRINODONTIFORMES
- Dorsal and anal fins may be spinous. Lateral line present on body. 2
2. No scales on head. No teeth on jaws. Mostly a single dorsal fin. CYPRINIFORMES
- Scales on head and body. Jaws with teeth. Dorsal fin mostly in two parts (spinous& rayed), continuous or separate PERCIFORMES

I Order CYPRINIFORMES

Key to families

1. Paired fins may or may not be horizontally inserted, one or more anterior rays of pectoral simple. Body depressed. No spine under or before eye. BALITORIDAE
- Paired fins laterally inserted, only first anterior ray of pectoral fin simple. Body not depressed. A spine under eye present or absent. 2
2. One or two pairs or no barbels. Body laterally compressed. No spine under eye.... CYPRINIDAE

- Three or four pairs of barbels. Body fusiform. A suborbital erectile spine
..... COBITIDAE *Lepidocephalus thermalis* Val.

Family CYPRINIDAE

Key to subfamilies

1. Upper lip continuous with skin of snout, mouth conspicuously inferior. Lower lip with a suctorial disc. GARRINAE *Garra mullya* (Sykes)
- Upper lip separated from skin of snout by a deep groove. Mouth anterior, inferior or subinferior. Lower lip without a suctorial disc. 2
2. A knob at symphysis of lower jaw fitting into an emargination of the upper jaw (exception *Chela*). Dorsal fin inserted behind base of pelvic fins. Lateral line when complete with an abrupt downward curvature anteriorly, running in lower half of body and caudal peduncle. DANIONINAE
- No knob at symphysis of lower jaw. Dorsal fin inserted before or opposite origin of pelvic fins. Lateral line complete or incomplete, running along middle of body and caudal peduncle. CYPRININAE

Subfamily DANIONINAE

Key to genera and species

1. A knob at symphysis of lower jaw absent. Predorsal scales do not extend to interorbital space. (Lateral line complete, a dark shoulder spot) *Chela laubuca* (Hamilton)
- A knob at symphysis of lower jaw present. Predorsal scales extend to interorbital space 2
2. Pectoral fins long with an axillary scale, may or may not reach the pelvic fins. (L.139-42; A.12-14; D.inserted in advance of anal fin.) *Salmostoma boopis* (Day)
- Pectoral fins short without an axillary scale 3
3. Cleft of mouth often extending beyond anterior margin of eye. (Body with 12-15 vertical bars; Anal fins with 15-17 rays) *Barilius gatensis* (Val.)
- Cleft of mouth not extending beyond anterior margin of eye. 4
4. Upper lip absent. Lateral line incomplete (P. 1/13-14; Head length less than 5 times in TL. 4-5 rows of scales between L1 and pelvic fin). *Amblypharyngodon microlepis* (Bleeker)
- Upper lip present. Lateral line complete when present. 5

5. Dorsal fin inserted opposite interspace between pelvic and anal fins. (Ll 35 to 38, Dorsal fin with 10-12 branched rays) *Danio malabaricus* (Jerdon)
- Dorsal fin inserted behind origin of pelvic fins (No barbels, 31-37 L. l. scales; A. 3/5) *Rasbora* spp. 6
6. Distance from anterior base of dorsal fin to end of hypural plate when carried forward falling behind posterior margin of eye. L. l. 36-37 scales. *Rasbora caverii* (Jerdon)
- Distance from anterior base of dorsal fin to end of hypural plate when carried forward falling before the posterior margin of eye. L. l. 31-34 scales. *Rasbora daniconius* (Hamilton)

Subfamily CYPRININAE
(Only one genus *Puntius* is represented)

Key to the Species

1. Body deep and compressed, dorsal spine osseous and serrated. (L. l. incomplete, no shoulder spot) *Puntius conchonius* (Ham.)
- Body elongate to less deep, dorsal spine when osseous not serrated 2
2. Dorsal fin with seven branched rays. *Puntius bimaculatus* (Bleeker)
- Dorsal fin with eight branched rays 3
3. Body elongate, dorsal fin plain without any markings. (One pair of barbel, a large blotch on base of caudal fin) *Puntius melanostigma* (Day)
- Body less elongate and more compressed, dorsal fin variously marked; with or without barbels. 4
4. Barbels absent, a single blotch on dorsal fin; predorsal sclae rows 8-10. *Puntius sophore* (Hamilton)
- One pair of barbels, rows of spots on dorsal, predorsal scale rows 10-12. *Puntius chola* (Hamilton)

Family BALITORIDAE

Key to subfamilies

1. Pectoral and pelvic fins horizontally inserted. Pectoral fin with two simple rays. **BALITORINAE**
- Pectoral and pelvic fins not horizontally inserted. Only one ray, the outermost pectoral fin ray alone is simple. **NEMACHEILINAE**
(Only subfamily Nemacheilinae is found in Biligiri Rangaswamy Temple Wildlife Sanctuary)

Key to Nemacheilinae

1. Anterior nostril produced into a long barbel. Body with irregular vertical bars (Nostril distant, nasal barbels reaching beyond middle of eye. Both lips interrupted in middle) *Oreonectes (Indoreonectes) evezardi* (Day)
- Anterior nostril not produced into a barbel. Body with dark regular cross bars. ... 2
2. Body slender and elongate about 6-7 times in SL. Dorsal origin equidistant or nearer snout than caudal base. Ventral fins separated from anal opening by a considerable distance. Bands 4-5 times broader than interspace. *Schistura nilgiriensis* Menon
- Body stouter and deeper, about 5.5 times in SL, dorsal origin nearer caudal base. Ventral fins almost reaching anal opening. Bands on body less broad, about 3 times the interspace *Schistura denisoni mukambikaensis* Menon

II Order CYPRINODONTIFORMES

Key to families and species

1. Pelvic fins placed close together, but not united. (26-29 scales in L. l. Eye diameter about half interorbital width) APLOCHEILIDAE *Aplocheilus blocki* (Arnold)
- Pelvic fins not close, well separated (Caudal peduncle length longer than head length, males with anterior anal rays elongated) 2

POECILIDAE

- 2 Teeth conical and fixed, dorsal fin inserted behind anal fin origin *Gambusia affinis* (Baird & Girard)
- Teeth spatuliform and movable, dorsal fin inserted in front of anal fin. *Poecilia reticulata* (Peters)

III Order PERCIFORMES

Key to suborders, families and species

1. A suprabranchial organ present. Head snake like (Dorsal and anal fins without spines. Pelvic fins sub-abdominal) CHANNOIDEI
(4 -5 scales between orbit and angle of preopercle. Pelvic fins less than half length of pectoral fins, pectoral fins spotted in zones) CHANNIDAE
- Suprabranchial organ absent..... *Channa orientalis* (Schneider)...2
2. Pelvic fins jugular in position, often united. Head generally with mucous canals.... GOBIOIDEI
(No scales between and before eyes on head. Teeth on lower jaw in several rows. Head depressed. GOBIIDAE

- Lower jaw prominent, tongue bilobate. Broad vertical rows of mucous canals on cheek. Branchiostegal membranes attached to Isthmus)
..... *Glossogobius giuris* (Hamilton)
- Pelvic fins thoracic or abdominal, not united. Head without mucous canals or pores.
..... 3
- 3. A single nostril on each side LABROIDEI CICHLIDAE
(Scales cycloid (rarely indistinctly ctenoid). Anal fin with 3 or 4 spines).
..... *Oreochromis mossambica* (Peters)
- A pair of nostrils on each side 4
(Anal fin with 2–3 (rarely four) spines) (Body short and compressed, translucent, moderate to small deciduous scales. Lower point of preopercle with a double serrated edge. Two dorsal fins. PERCOIDE I CHANDIDAE
- A forwardly directed recumbent spine in front of dorsal fin).
- 4. Lower jaw strongly projecting, Canine teeth on lower jaw. Scales minute more than 100, a vertical band behind opercle. *Chanda nama* Hamilton
Lower jaw not prominent, no canine teeth on lower jaw. Scales moderate, less than 70, a black blotch on upper opercle. *Parambassis ranga* (Hamilton)

* Additional characters are provided in brackets along with the dichotomous key to enable specific identity, when more taxa are known elsewhere

SYSTEMATIC ACCOUNT

Order CYPRINIFORMES

Family CYPRINIDAE

Subfamily DANIONINAE

1. *Chela laubuca* (Hamilton)
2. *Salmostoma boopis* Day
3. *Amblypharyngodon microlepis* (Bleeker)
4. *Rasbora caverii* (Jerdon)
5. *Rasbora daniconius* (Hamilton)
6. *Danio malabaricus* (Jerdon)
7. *Barilius gatensis* (Val.)

Subfamily CYPRININAE

8. *Puntius bimaculatus* (Bleeker)

9. *Puntius chola* (Hamilton)
10. *Puntius sophore* (Hamilton)
11. *Puntius conchonius* (Hamilton)
12. *Puntius melanostigma* (Day)

Subfamily GARRINAE

13. *Garra mULLya* (Sykes)

Family COBITIDAE

14. *Lepidocephalus thermalis* (Val.)

Family BALITORIDAE

Subfamily NOEMACHEILINAE

15. *Oreonectes (Indoreonectes) evezardi* (Day)

16. *Schistura denisoni mukambikaensis* Menon

17. *Schistura nilgiriensis* Menon

Order CYPRINODONTIFORMES

Family APLOCHEILIDAE

18. *Aplocheilus blocki* Arnold

Family POECILIDAE

19. *Gambusia affinis* (Baird & Girard)

20. *Poecilia reticulata* (Peters)

Order PERCIFORMES

Suborder PERCOIDEI

Family CHANDIDAE

21. *Chanda nama* Hamilton

22. *Parambassis ranga* (Hamilton)

Suborder LABROIDEI

Family CICHLIDAE

23. *Oreochromis mossambica* (Peters)

Suborder GOBIOIDEI

Family GOBIIDAE

24. *Glossogobius giuris* (Hamilton)

Suborder CHANNOIDEI

Family CHANNIDAE

25. *Chana orientalis* (Schneider)

Order CYPRINIFORMES

Family CYPRINIDAE

Subfamily DANIONINAE

1. *Chela laubuca* (Hamilton-Buchanan)

1822. *Cyprinus (Chela) laubuca* Hamilton, *Fishes of Ganges*, : 260, 384 (Type locality : Ponds in Northern Parts of Bengal).

1991. *Chela laubuca*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 316.

Material : 1 ex., 39 mm SL, Kolipalya, 18.ii.99, F. 6554, Coll. S. Krishnan.

Distribution : India.

Elsewhere : Pakistan, Bangladesh, Myanmar, Malay Peninsular, Sumatra.

2. *Salmostoma boopis* (Day)

1873. *Chela boopis* Day, 1873, *Proc. zool. Soc. Lond.*, : 708 (Type locality : South Canara)

1991. *Salmostoma boopis*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 322

Material : 9 exs., 44-82 mm SL, Kolipalya, 18.2.99, F. 6555, Coll. S. Krishnan.

Distribution : India : Western Ghats : Karnataka and Maharastra.

3. *Amblypharyngodon microlepis* (Bleeker)

1853. *Leuciscus microlepis* Bleeker, *Verh. Batav. Genootsch. Kunst. Wet.*, 25 : 141 (Type locality : Bengal).

1991. *Amblypharyngodon microlepis*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 337.

Material : 16 exs., 31-48 mm SL, Nalluru, 8.iv.2000, F. 6581, Coll. S. Krishnan.

Distribution : India : Eastern and Southern India.

Elsewhere : Bangladesh.

4. *Rasbora caverii* (Jerdon)

1849. *Leuciscus caverii* Jerdon, *Madras J. Sci., & Lit.*, 15 : 320 (Type locality : Cauvery River, Karnataka)

1991. *Rasbora caverii*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 388.

Material : 3 exs., 30-52 mm SL, Parashukatta to Budhipadaga, 640 m, 28.ii.2000, F. 6333, Coll. G. Thirumalai; 78 exs., 18-35 mm SL, Foot Hills, K. Gudi, 600 m, 1.ii.2000, F. 6337, Coll. G. Thirumalai; 5 exs., 26-34 mm SL, Biligiri Rangaswamy Temple Hills Foot Hills, K. Gudi, 600 m, 1.iii.2000, F. 6338, Coll. G. Thirumalai; 2 exs., 37 & 38 mm SL, Biligiri

Rangaswamy Temple Hills, 22.ii.99, Coll. S. Krishnan; 1 ex., 73.0 mm SL, Nalluru, 8.iv.2000, F. 6583, Coll. S. Krishnan; 6 exs., 50-62.5 mm SL, Krishnankette, 11.iv.2000, F. 6661, Coll. S. Krishnan.

Remarks : 1 ex., 73.0 mm SL, Nalluru, 8.iv.2000, F. 6583 has hypertrophied lip and resembles *R. labiosa*

Distribution : Southern India, notably Karnataka, especially the Cauvery Basin, also Eastern Ghats.

Elsewhere : Sri Lanka.

5. *Rasbora daniconius* (Hamilton)

1822. *Cyprinus daniconius* Hamilton, *Fishes of Ganges*, : 327, 391, pl. 15, fig. 89 (Type locality : Rivers of Southern Bengal).

1999. *Rasbora daniconius*, Jayaram, *The freshwater fishes of the Indian region*, : 82.

Material : 11 exs., 35-53 mm SL, Boodipadaga, 18.ii.1999, F. 6144, Coll. S. Krishnan.; 2 exs., 49-66 mm SL, Kolipalya, 18.ii.1999, F. 6557, Coll. S. Krishnan; 16 exs., 19-46.5 mm SL, Nalluru, 8.iv.2000, F. 6582, Coll. S. Krishnan; 7 exs., 24-45 mm SL, Budhipadaga, 7.iv.2000, F. 6611, Coll. S. Krishnan; 1 ex., 40 mm SL, Sebinakere, 7.iv.2000, F. 6656, Coll. S. Krishnan; 5 exs., 31-58 mm SL, Krishnankette, 11.4.2000, F. 6662, Coll. S. Krishnan; 1 ex., 36 mm SL, Bhanuvadi, 19.ii.1999, F. 6152, Coll. S. Krishnan.

Distribution : Throughout India.

Elsewhere : Bangladesh, Malay Archipelago, Myanmar, Nepal, Pakistan, Sri Lanka.

6. *Danio malabaricus* (Jerdon)

1849. *Perilampus malabaricus* Jerdon, *Madras. J. Litt. & Sci.*, 15 : 325. (Type locality : Malabar)

1991. *Danio malabaricus*, Talwar & Jhingran, *Inland fishes of India and adjacent countries*, I : 388.

Material : 3 exs., 17-28 mm SL, Boodipadaga, 18.ii.1999, Coll. S. Krishnan; 2 exs., 25 & 26 mm SL, Biligiri Rangaswamy Temple Hills, 22.xi.1999, Coll. M. B. Raghunathan; 52 exs., 37-66 mm SL, Kolipalya, 18.ii.1999, F. 6560, Coll. S. Krishnan; 18 exs., 23-44 mm SL, Bhanavadi, 19.ii.1999, F. 6152, Coll. S. Krishnan.

Distribution : India : Krishna River Basin and Western Ghats from Maharashtra to Kerala.

Elsewhere : Sri Lanka.

7. *Barilius gatensis* (Valenciennes)

1844. *Leuciscus gatensis* Valenciennes, *Hist. nat. Poiss.*, 17 : 309, pl. 503 (Type locality : Peninsular of India).

1991. *Barilius gatensis*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 349.

Material : 5 exs., 65-79 mm SL, Kolipalya, 18.2.1999, F.6556, Coll. S. Krishnan.

Distribution : India : Western Ghats.

Subfamily CYPRININAE

8. *Puntius bimaculatus* (Bleeker)

1864. *Gnathopogon bimaculatus* Bleeker, Verh. Nat. Holl. Maatsch, Haarlem, (2)20 : 17, pl. 4, fig. 1
(Type locality : Ceylon).

1991. *Puntius bimaculatus*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 259.

Material: 1 ex., 34 mm SL, Kolipalya, 18.ii.1999, F.6558, Coll. S. Krishnan; 1 ex., 38 mm SL, Sebinakere, 7.iv.2000, F. 6655, Coll. S. Krishnan; 1 ex., 31.5 mm SL, Krishnankette, 11.iv.2000, F. 6660, Coll. S. Krishnan; 2 exs., 25 and 29 mm SL, Bhanuwadi, 19.ii.99, F. 6154, Coll. S. Krishnan.

Distribution : Southern India.

Elsewhere : Sri Lanka.

9. *Puntius chola* (Hamilton)

1822. *Cyprinus chola* Hamilton, *Fishes of Ganges* : 312, 389.

1991. *Puntius chola* : Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 263.

Material : 14 exs., 28-39 mm SL, Basvanagodu, 900 m, 3.iv.1999, F. 6091, Coll. G. Thirumalai; 1 ex., 49 mm SL, Kolipalya, 18.ii.1999, F. 6559, Coll. S. Krishnan.

Distribution : Throughout India.

Elsewhere : Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka.

10. *Puntius sophore* (Hamilton)

1822. *Cyprinus sophore* Hamilton, 1822, *Fishes of Ganges* : 310, 389 (pl. 19, fig. 86) (Type locality : Ponds and rivers in Gangetic plains)

1991. *Puntius sophore*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 288.

Material : 1 ex., 48 mm SL, on the way from Parashukatta to Budhipadaga, 28.ii.2000, F. 6334, Coll. G. Thirumalai; 2 exs., 29-39 mm SL., Nalluru, 8.iv.2000, F. 6585, Coll. S. Krishnan.

Distribution : India : Throughout.

Elsewhere : Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka.

11. *Puntius conchonius* (Hamilton)

1822. *Cyprinus conchonius* Hamilton, *Fishes of Ganges*, : 317, 389 (Type locality : Ponds of northeast Bengal, Kosi river and Ami River).

1991. *Puntius conchonius*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 266.

Material : 6exs., 30-56 mm SL, Nalluru, 8.iv.2000, F. 6584, Coll. S. Krishnan.

Distribution : India : Throughout Northern India; Cauvery System in the South.

Elsewhere : Bangladesh, Nepal, Pakistan.

12. *Puntius melanostigma* (Day)

1878. *Barbus melanostigma* Day, 1878. *Fishes of India* : 573, pl. 143, fig. 1 (Type locality : Wynnaad, Kerala).

1991. *Puntius melanostigma*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 275.

Material : 1 ex., 33 mm SL, Biligiri Rangaswamy Temple Hills, 22.xi.1999, F. 6413, Coll. M.B. Raghunathan.

Distribution : India : Western Ghats : Kerala, Tamil Nadu, Maharashtra.

Subfamily GARRINAE

13. *Garra mullya* (Sykes)

1841. *Chondrostoma mullya* Sykes., 1841, *Trans. zool. Soc. Lond.*, 2 : 359, pl. 62, fig. 3 (Type locality : Bheema river at Daunde, Poona).

1991 *Garra mullya*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, I : 429.

Material : 5 exs., 37-53 mm SL, Budhipadaga, 18.ii.1999, F. 6145, Coll. S. Krishnan; 1 ex., 46 mm SL, Budhipodaga, 7.4.2000, F. 6614, Coll. S. Krishnan; 1 ex. 39 mm SL, Sebinakere, 7.iv.2000, F. 6617, Coll. S. Krishnan; 5 exs., 34-38 mm SL, Girialla, 22.ii.99, F. 6158, Coll. S. Krishnan; 19 exs., 28-51 mm SL, Kabbanagatthe, 22.ii.1999, F. 6159, Coll. S. Krishnan.

Remarks : In 5 exs., 34-38 mm SL F. 6158 from Girialla & 19 exs., 25-51 mm SL F. 6155 from Kabbanagatta the mental disc is large and scales are absent between pectoral base.

Distribution : Throughout India except Assam and the Himalaya.

Family COBITIDAE

14. *Lepidocephalus thermalis* (Val.)

1846. *Cobitis thermalis* Val., 1846, *Hist. nat. Poiss.*, 18 : 78 (Type locality : Sri Lanka).

1991. *Lepidocephalus thermalis*, Talwar & Jhingran, *Inland fishes of India and adjacent countries*, I : 527.

Material : 2 exs., 28 & 30 mm SL, Biligiri Rangaswamy Temple Hills, 1050 m, 1.iii.99, F. 6168, Coll. S. Krishnan; 35 exs., 26-50 mm SL, Road from Parashukatta to Budhipadaga, 640 m, 28.ii.2000, F. 6335, Coll. G. Thirumalai; 2 exs., 35 & 36 mm SL, Biligiri Rangaswamy Temple Hills, 900 m, 29.ii.2000, Coll. G. Thirumalai; 5 exs., 26-34 mm SL, Biligiri Rangaswamy Temple FootHills, K. Gudi, 600 m, 1.iii.2000, F. 6338, Coll. G. Thirumalai; 46 exs., 26-38 mm SL, Biligiri Rangaswamy Temple Hills, 22.xi.99, F. 6414, Coll. M. B. Raghunathan; 8 exs., 30-39 mm SL, Nalluru, 8.iv.2000, F. 6586, Coll. S. Krishnan; 1. ex., 47 mm SL, Budhipadaga, 7.4.2000, F. 6613, Coll. S. Krishnan; 4 exs., 43-47 mm SL, Sebnakere, 7.iv.2000, F. 6658, Coll. S. Krishnan; 6 exs., 27-37 mm SL, Bhanuwadi, 19.ii.99, F. 6155, Coll. S. Krishnan.

Distribution : India : South India.

Elsewhere : Sri Lanka.

Family BALITORIDAE

SubFamily NOEMACHEILINAE

15. *Oreonectes (Indoreonectes) evezardi* Day

1878. *Nemacheilus evezardi* Day, *Fishes of India*, : 613, pl. 153, fig. 11 (Type locality : Poona)

1987. *Oreonectes (Indoreonectes) evezardi*, Menon, *Fauna of India and the adjacent countries*, IV : 191.

Material : 2 exs., 33.5 & 45 mm SL, Gombakkalpodu, 9.iv.2000, F. 6609, Coll. S. Krishnan; 3 exs., 27-44 mm SL, Girialla, 22.ii.1999, F. 6156, Coll. S. Krishnan; 1 ex., 25 mm SL, Kabbanagathe, 22.ii.1999, F. 6161, Coll. S. Krishnan.

Remarks : The record of the species from Biligiri Rangaswamy Temple Wildlife Sanctuary and its distribution has been discussed elsewhere (Rema Devi *et al.* 2002).

Distribution : India : Western Ghats : Krishna, Godavari and Cauvery Basins; Satpura range, Pachmarhi hills.

16. *Schistura denisoni mukambikaensis* (Menon)

1987. *Noemacheilus denisoni mukambikaensis* Menon, *Fauna of India, Pisces*, 4 : 101, pl. 10, fig. 7 (Type locality : Mukambika, Karnataka)

Material : 2 exs., 23-43 mm SL, Boodipadaga, 18.ii.1999, F. 6150, Coll. S. Krishnan; 35 exs., 17-43 mm SL, Girialla, 22.ii.1999, F. 6157, Coll. S. Krishnan; 16 exs., 21-45 mm SL, Kabbanagathe, 22.ii.99, F. 6160, Coll. S. Krishnan.

Remarks : This is the first report of the species from outside its type locality (Menon, 1987).

Distribution : India : Karnataka : Kashi stream, a tributary of Kollur river, Mukambika; Biligiri Rangaswamy Temple Wildlife Sanctuary.

17. *Schistura nilgeriensis* (Menon)

1987. *Nemacheilus nilgeriensis* Menon, *Fauna of India, Pisces*, 4 : 106, pl. 10, figs. 8, 9 & pl. 14, figs. 1 & 2 (Type locality : Pykara Dam, Nilgiri Dt., Tamil Nadu).

Material : 250 exs., 23-48 mm SL, Basavanagodu, 900 m, 3.iv.99, F. 6090, Coll. G. Thirumalai; 13 exs., 23-57 mm SL, Sebinakere, 1110 m, 4.iv.99, F. 6093, Coll. G. Thirumalai; 10 exs., 14-28 mm SL, Dorgadu, 1100 m, 5.iv.99, F. 6094, Coll. G. Thirumalai; 2 exs., 37 & 43 m SL, 7 km. from K. Gudi to Biligiri, 24.ii.99, F. 6162, Coll. S. Krishnan; 22 exs., 20-33 mm SL, Kenkere, 3400, 25.ii.99, F. 6164, Coll. S. Krishnan; 125 mm SL 19-44 mm SL, Basavanagodu, 3400', 28.ii.99, F. 6166, Coll. S. Krishnan; 128 exs., 20-47 mm SL, Kenkere, 3400, 1.iii.99, F. 6167, Coll. S. Krishnan; 1 ex., 20 mm SL, Biligiri Rangan Temple Hills, 1050 m, 1.iii.99, Coll. S. Krishnan; 35 exs., 20-51 mm SL, Sebinakere, 1140m, 27.ii.2000, F. 6332, Coll. G. Thirumalai; 162 exs., 20-47 mm SL, Biligiri Rangan Temple Hills, 900 m, 29.ii.2000, F. 6336, Coll. G. Thirumalai; 38 exs., 16-43 mm SL, Doddachempike, 1100 m, 2.iii.2000, F. 6339, Coll. G. Thirumalai; 5 exs., 25-32 mm SL, Biligiri Rangan Temple Hills, 22.xi.99, Coll. M. B. Raghunathan; 52 exs., 23-45 mm SL, Gombekkalpodu, 9.iv.2000, F. 6610, Coll. S. Krishnan; 43 exs., 30-50 mm SL, Dorasanialla, 7.iv.2000, F. 6672, Coll. S. Krishnan.

Remarks : This is the first record of the species from outside its type locality though much variation in number of bands are observed, the species answers to the overall description of *S. nilgeriensis* (Menon, 1987).

Distribution : India : Western Ghats : Nilgiris, Tamil Nadu, Karnataka : Biligiri Rangaswamy Temple Wildlife Sanctuary.

Order CYPRINODONTIFORMES

Family APLOCHEILIDAE

18. *Aplocheilus blocki* (Arnold)

1911. *Haplocheilus panchax* Var. *blockii* Arnold, 1911, *Wochenschr. Aquarien und Terrarinkunde*, 8 : 672 (Type locality : Madras)

1991. *Aplocheilus blocki*, Talwar & Jhingran, *Inland fishes of India and adjacent countries*, II : 750.

Material : 1 ex., 23 mm SL, Budhipadaga, 7.iv.2000, F. 6617, Coll. S. Krishnan.

Distribution : India : Gujarat, Kerala, Tamil Nadu, Karnataka.

Remarks : This is the first report of the species from Karnataka.

Family POECILIDAE

19. *Gambusia affinis* (Baird & Girard)

1853. *Heterandria affinis* Baird and Girard, *Proc. Acad. Nat. Sci., Philad.*, 6 : 390 (Type locality : San Antonio River Drainage, Texas)

1991. *Gambusia affinis*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, II : 756.

Material : 3 exs., 22-25 mm SL, Basavanagodu, 900 m, 3.iv.99, F. 6092, Coll. G. Thirumalai; 6 exs., 18-30 mm SL, Nalluru, 8.iv.2000, F. 6587, Coll. S. Krishnan.

Distribution : Introduced into India.

Elsewhere : Myanmar. Pakistan. Sri Lanka.

20. *Poecilia (Lebistes) reticulata* (Peters)

1859. *Poecilia reticulata* Peters, K. Preussisehem. *Akad. Wiss. Berlin.*, : 412 (Type locality : Venezuela)

1991. *Poecilia reticulata*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, II : 758.

Material : 28 exs., 13-24 mm SL, 7 km from K. Gudi to Biligiri, 24.ii.99, F. 6163, Coll. S. Krishnan; 11 exs., 16-20 mm SL, Biligiri Rangaswamy Temple Hills, 1050 m, 1.iii.99, F. 6169, Coll. S. Krishnan; 350 exs., 11-31 mm SL, Biligiri Rangaswamy Temple Hills, 22.xi.99, F. 6415, Coll. M. B. Raghunathan.

Distribution : Introduced into India.

Elsewhere : Tropical America.

Order PERCIFORMES

Suborder PERCOIDEI

Family CHANDIDAE

21. *Chanda nama* Hamilton

1822. *Chanda nama* Hamilton, *Fishes of Ganges* : 109, 371, pl. 39, fig. 37 (Type locality : Ponds throughout Bengal).

1991. *Chanda nama*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, II : 799.

Material : 1 ex., 24 mm SL, Biligiri Rangaswamy Temple Hills, 22.xi.99, Coll. M. B. Raghunathan; 4 exs., 19-33 mm SL, Budhipadaga, 7.iv.2000, F. 6615, Coll. S. Krishnan.

Distribution : India.

Elsewhere : Pakistan, Nepal, Bangladesh, Myanmar.

22. *Parambassis ranga* (Hamilton)

1822. *Chanda ranga* Hamilton, *Fishes of Ganges*, : 113, 371, pl. 16, fig. 38 (Type locality : Freshwaters of all parts of Gangetic Provinces)

1999. *Parmabasis ranga*, Jayaram, The freshwater fishes of the Indian region : 370.

Material : 34 exs., 31-41 mm SL, Boodipadaga, 18.ii.1999, F. 6146, Coll. S. Krishnan; 2 exs., 50 & 56 mm SL, Kolipalya, 18.ii.99, F. 6562, Coll. S. Krishnan; 1 ex., 21 mm SL, Buddipadaga, 7.iv.2000, F. 6616, Coll. S. Krishnan; 7 exs., 23-27 mm SL, Sebinakere, 7.iv.2000, F. 6659, Coll. S. Krishnan; 7 exs., 32-45 mm SL, Krishnankette, 11.iv.2000, F. 6663, Coll. S. Krishnan.

Distribution : India.

Elsewhere : Bangladesh, Malaysia, Thailand, Myanmar.

Suborder LABROIDEI

Family CICHLIDAE

23. *Oreochromis mossambica* (Peters)

1852. *Chromis (Tilapia) mossambicus* Peters, *Montab, Acad. Wiss., Berlin*, : 681 (Type locality : Mozambique)

1991. *Oreochromis mossambica*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, II : 887.

Material : 7 exs., 23-55 mm SL, Kenkere, 3400', 25.ii.99, F. 6165, Coll. S. Krishnan; 2 exs., 20 & 22 mm SL, Biligiri Rangaswamy Temple Hills, 22.xi.99, Coll. M. B. Raghunathan; 7 exs., 39-50 mm SL, Nalluru, 8.iv.2000, F. 6588, Coll. S. Krishnan.

Distribution : Introduced in India in 1952.

Elsewhere : East Africa to Nepal.

Suborder GOBIOIDEI

Family GOBIIDAE

24. *Glossogobius giuris* (Hamilton)

1822. *Gobius giuris* Hamilton, *Fishes of Ganges* : 51, pl. 33, fig. 15 (Type locality : Gangetic provinces)

1991. *Glossogobius giuris*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, II : 935.

Material : 1 ex., 31 mm SL, Biligiri Rangaswamy Temple Hills, 22.xi.99, Coll. M. B. Raghunathan; 1 ex., 36 mm SL, Kolipalya, 18.ii.99, F.6561, Coll. S. Krishnan; 3 exs., 30-70 mm SL, Nalluru, 8.iv.2000, F.6589, Coll. S. Krishnan; 1 ex., 140 mm SL, Dorasaniallae,

7.iv.2000, F. 6594, Coll. S. Krishnan; 1 ex., 60 mm SL, Krishnankette, 11.iv.2000, F. 6664, Coll. S. Krishnan.

Remarks : In 1 ex., 36 mm SL from Kolipalya the opercle is free from isthmus as in *Glossogobius biocellatus*. Since the specimen is a juvenile this is tentatively placed retained under *G.iuris* till further studies are carried out.

Distribution : Throughout India.

Elsewhere : It has a wide range from the East coast of Africa to Japan, Australia and South Pacific.

Suborder CHANNOIDEI

Family CHANNDAE

25. *Channa orientalis* (Bloch & Schneider)

1801. *Channa orientalis* Bloch and Schneider, 1801, *Syst. Ichth.*, : 496, pl. 90, fig. 2. (Type locality : India).

1991. *Channa orientalis*, Talwar & Jhingran, *Inland fishes of India and adjacent countires*, II : 1014.

Material : 1 ex., 68 mm SL, Boodipadaga, 18.ii.99, F. 6151, Coll. S. Krishnan.

Distribution : India.

Elsewhere : Afghanistan, Bangladesh, Borneo, Iran, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand.

SUMMARY

This being the first report of the ichthyofauna of Biligiri Rangasamy Temple Wildlife Sanctuary all the twenty five species encountered make interesting study. About 1/3 (8 species) of the total fauna (25 spp.) collected are endemic to India viz., *Salmostoma boopis*, *Barilius gatensis*, *Puntius melanostigma*, *Schistura* (d.) *mukambikaensis*, *S.* (d.) *nilgiriensis*, *Oreonectes* (I.) *evezardi*, *Garra mULLya* and *Aplocheilus blocki*. Of these the first five species are restricted to the Western Ghats. Further 11 species are restricted to the Indian subcontinent and all are common to Sri Lanka viz., *Amblypharyngodon microlepis*, *Rasbora caverii*, *Rasbora daniconius*, *Danio malabaricus*, *Puntius bimaculatus*, *Puntius chola*, *Puntius sophore*, *Puntius conchonius*, *Lepidocephalus thermalis*, *Chanda nama*, *Parambassis ranga*; two species have a wider distribution viz., *Chela laubuca* & *Channa orientalis* and three are introduced species viz., *Gambusia affinis*, *Poecilia reticulata* and *Oreochromis mossambica*.

The fish fauna bears typical Western Ghat endemics and confirms the earlier continuity of Biligiri Rangaswamy Temple Wildlife Sanctuary and Western Ghats.

REFERENCES

- DAY, F. 1875-78. The Fishes of India, being a natural history of the fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon. Text and atlas in 4 parts, London, xx, : 778, 195 pls.
- JAYARAM, K.C. 1999. The Freshwater Fishes of the Indian Region. Narendra Publishing House, New Delhi, : xxvii + 551., pls. xviii.
- MENON, A.G.K. 1987. *The fauna of India and the Adjacent Countries. Pisces 4. Teleostei – Cobitidae, part 1. Homalopteridae. Zoological Survey of India, Calcutta*, : X + 259, 16 pls.
- MENON, A.G.K., 1999. Checklist- Freshwater Fishes of India. *Rec. zool. Surv. India, Occ. Paper No., 175* : I-xxix, 1-366.
- REMA DEVI, K., T.J. INDRA and KRISHNAN, S. 2002. On the Distribution of *Oreonectes (Indoreonectes) evezardi* Day and *Oreonectes (Indoreonectes) keralensis* Rita, Banarescu and Nalbant (Pisces : Balitoridae). *J. Bombay nat. Hist. Soc.*, 99(1) : 127-129.
- TALWAR, P.K. AND JHINGRAN, A.G. 1991. Inland Fishes of India and Adjacent countries. Oxford and IBM Publishing Co. Pvt. Ltd., New Delhi, 2 volumes, : xix + 1158.

AMPHIBIA

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INTRODUCTION

Amphibians by the process of terrestriallisation have colonized the water's edge in ecosystems of varfous altitudes. The differential distribution patterns, according to altitudes, edaphic conditions and forest litter are well documented (Boulenger, 1882, 1890, 1904, 1920, Chanda & Deuti, 1997, Das and Chanda,1998, Das and Dutta,1998 Daniels, 1992, Inger and Dutta, 1986, Pillai, 1978 & 1986 and Ravichandran, 2001)

To be precise, 206 species of Anurans, 21 species of Gymnophoria and one species of Caudata have so far been reported reliably from India. The Biligiri Rangaswamy Temple Wildlife Sanctuary is unique in forest cover, perennial lotic and lentic water bodies. Field surveys in this area have been few and far in between. Hence in order to present a reliable ground truth we present base line information on the distribution of Amphibian fauna of this area. This list is not conclusive but progressive, opening portals for more investigation and enlistment of more taxa. As the genus *Rana* is under revision by experts, we deploy the earlier nomenclature with currently introduced name in parenthesis.

SYSTEMATIC ACCOUNT

Class AMPHIBIA

Order ANURA

Family BUFONIDAE

1. *Bufo melanostictus* Schneider

1799. *Bufo melanostictus* Schneider, *Hist. Amph.*, 1 : 216.

Diagnostic Characters : Large sized toads, well developed prominent cranial ridges with tubercles bearing black cornifications, parietal ridges absent, parotoid glands large, kidney-shaped, tympanum two-third diameter of the eye, skin highly warty; tips of fingers and toes blunt, toes about half webbed.

Material examined : 1 ex., 7 km from K. Gudi to Biligiri Ranganpettah, 24.ii.1999, Coll. : S.Krishnan; 1 ex., Budipaduga, 28.ii.2000, Coll. G. Thirumalai; 9 exs., Nallur, 8.iv.2000, Coll. S. Krishnan; 2 exs., Gombaekalpodu, 9.iv.2000, Coll. S. Krishnan.

Measurement : Snout-vent length : 20.5–79.00 mm

Family MICROHYLIDAE

2. *Microhyla ornata* (Dumeril & Bibron)

1841. *Engystoma ornatum* Dumeril and Bibron, *Erpet. Gen.*, viii : 745

1934. *Microhyla ornata* Parker, *Monogr. Frogs Fam. Microhylidae*, : 139

Diagnostic Characters : Small sized microhylid; body ridges present; papillae absent behind internal nares; tongue entire, oval, without median furrow behind; tympanum not distinct; dorsum with characteristic colour pattern; with smooth skin; limbs with crossbars; tip of fingers not dilated; two normal metatarsal tubercles.

Material examined : 2 exs., Hanakere, 27.ii.1999, Coll. : S. Krishnan; 1 ex., Krishnankette, 11.iv.2000, Coll. S. Krishnan.

Measurement : Snout-vent length : 17.5–18.0 mm.

3. *Microhyla rubra* (Jerdon)

1854. *Engystoma rubrum* Jerdon *Journ. Asiatic Soc., Bengal.*, xxii : 534

1974. *Microhyla rubra* Parker, *Monogr. Frogs Fam. Microhylidae*, : 142.

Diagnostic Characters : Small microhylid; body robust; dorsally reddish brown, distinguishable by the presence of more webbed toes, web reaching the last row tubercles, subarticular tubercles prominent, dorsal region dark, tympanum hidden, forelimbs short; in males subgular vocalsac area blackish in breeding season, limbs indistinctly cross barred.

Material examined : 1 ex., Doddasempige, 25.ii.1999, Coll. S. Krishnan; 2 es., Kombarmathi, 26.ii.1999, Coll. S. Krishnan; 2 exs., Duruguru, 29.ii.1999, Coll. S. Krishnan; 1 ex., Hanakere, 1.iii.1999, Coll. S. Krishnan.

Measurement : Snout-vent length : 14–22 mm.

4. *Microhyla sholigari* Dutta & Ray

2000. *Microhyla sholigari* Dutta & Ray, *Hamadryad.*, 25(1) : 38-44.

Diagnostic Characters : Head wider than long, finger and toe tips dilated, a median longitudinal groove dorsally on the toe, outer and inner side of 4th toe webbed between proximal and distal subarticular tubercles; two large metatarsal tubercles, inner elongated outer rounded; venter white; nostrils dorsolateral with rounded openings; loreal region

oblique; eye large, pupil circular; tympanum not visible due to supra tympanic fold; no disc on finger, a light brown mid-dorsal marking starting between eyes widens at mid body, narrows on abdomen, fans out at cloaca.

Material examined : 1 ex (Holotype) ZSI A 9061, Sub adult female, Doddsempige, 9.ii.1997, Coll. P. Ray.

Remark : This species described from Biligiri Rangaswamy Temple Wildlife Sanctuary needs further studies and exploration. It has also been recently reported from the Western Ghats of Kerala by Biju (2001).

5. *Kaloula pulchra* Gray

1831. *Kaloula pulchra* Gray, *Zool. Misc.*, 1 : 38

Diagnostic Characters : Large microhylid with typical painted copper brown dorsal; with yellow dorsolateral stripe; snout short and rounded, loreal region oblique; fingers with well developed truncated discs, toes webbed up to one-third (1/3).

Material examined : 3 exs., Gombaekalpodu, 9.iv.2000, Coll. S. Krishnan.

Measurements : Snout-vent length : 17-29 mm.

Family RANIDAE

6. *Micrixalus opisthorhodus* (Gunther) [=*Micrixalus phyllophilus* (Jerdon)]

1868. *Ixalus opisthorhodus* Gunther, *Proc. Zool. Soc.*, London, 484.

2000. *Micrixalus phyllophilus* Biju, Occassional Publication, 1 : ISCB : 16.

Diagnostic Characters : A small micrixalus distinguished from others by angular canthus rostralis, dorsolateral glandular folds and papilla on tongue; dorsal side brown, fading to yellow through lateral; finger free with dilated tips ending in discs; a very prominent black band on either side of eye and nostril present.

Material examined : 1 ex., Doddasempige, 25.ii.1999, Coll. S. Krishnan; 2 exs., Basavanagodu, 28.ii.1999, Coll. S.Krishnan; 1 ex., Duruguru, 29.ii.1999, Coll. S. Krishnan.

Measurement : Snout-vent length : 14-22.5 mm.

7. *Nyctibatrachus major* Boulenger

1882. *Nyctibatrachus major* Boulenger, *Cat. Batr. Sal. Brit. Mus.*, 114.

Diagnostic Characters : Size medium to large; body stout; snout short; canthus rostralis indistinct; tympanum not clear; interorbital space nearly twice broader than upper eyelid;

tongue flat without papilla; vomerine teeth present; skin loose with closely set netted folds on dorsum; fingers free, toes three-fourths webbed, digital discs present; dark brown dorsum with darker margins on the skin folds; limbs with bars, webbing on feet absent.

Material examined : 3 exs., Hanakere, 27.ii.1999, Coll. S.Krishnan, 2exs., Basavanagodu, 28.ii.1999, Coll. S. Krishnan, 3 exs., Duruguru, 29.ii.1999, Coll. S. Krishnan, 2 exs., Dorasanialla, 7.iv.2000, Coll. S. Krishnan.

Measurements : Snout-vent length : 19.5–31 mm.

8. *Rana beddomii* (Gunther)
[= *Indirana beddomii* (Gunther)]

1875. *Polypedates beddomii* Gunther, Proc. Zool. Soc., London, : 571.

1920. *Rana beddomii* Boulenger, Rec. Indian Mus., xx : 114.

Diagnostic Characters : Small to medium-sized frogs; snout rounded or obtusely pointed; tympanum distinct; interorbital space as broad as upper eyelid; a median, pointed papilla present on tongue; vomerine teeth present; skin with fine granulation and short glandular longitudinal folds; fingers free; toes two-thirds webbed; both finger and toe-tips end in discs, bearing circum-marginal grooves; tibio-tarsal articulation reaching tip of snout or a little beyond; a black streak from supra tympanic fold to shoulder, a dark cross band between eyes, dorsum brown.

Material examined : 5 exs., Doddasempige, 25.ii.1999, Coll. S.Krishnan.

Measurements : Snout-vent length : 15-24.5 mm.

9. *Rana curtipes* Jerdon
[= *Rana (Clinotarsus) curtipes* Jerdon]

1853. *Rana curtipes* Jerdon, J. Asiatic. Soc., Bengal, XXII : 532

1989. *Rana curtipes* Daniel and Sekar J. Bombay nat. Hist. Soc., 86(2) : 196.

Diagnostic Characters : Medium to moderately large frogs; snout rounded or blunt; tympanum very distinct; inter orbital space broader than upper eyelid; papilla on tongue absent; vomerine teeth poorly developed, some times indistinct; dorsum smooth; distinct, narrow, dorso lateral glandular folds present; fingers free, toes nearly three fourths webbed; fingers with swollen tips; toe-tips dilated into small discs, with or without feeble marginal grooves; colour highly variable from shades of gray to crimson.

Material examined : 3 exs., Kombarmathi, 26.ii.1999, Coll. S. Krishnan; 1 ex., Duruguru, 29.ii.1999, Coll. S. Krishnan; 1 ex., Hanakere, 1.iii.1999, Coll. S. Krishnan.

Measurements : Snout-vent length : 27–32 mm.

10. *Rana cyanophlyctis* Schneider
[= *Euphlyctis cyanophlyctis* (Schneider)]

1799. *Rana cyanophlyctis* Schneider, *Hist. Amph.*, 1 : 137.

1975. *Rana cyanophlyctis* Daniel, *J. Bombay nat. Hist. Soc.*, 72(2) : 510.

Diagnostic Characters : Small to medium-sized frog; tympanum large, distinct; snout rounded; interorbital space very narrow; papilla on tongue absent; vomerine teeth present; dorsum rough with small warts, a single row of porous warts on flanks; upper surface with olive green to brown colouration, circular markings; fingers free, toes fully webbed, digital discs absent.

Material examined : 1 ex., Budipaduga, 18.ii.1999, Coll. S. Krishnan; 3 exs., Bedaguli, 20.ii.1999, S. Krishnan; 1 ex., 7 km from K. gudi to Biligiri Ranganpeta, 24.ii.1999, Coll. S. Krishnan; 7 exs., Doddasempige, 25.ii.1999, Coll. S. Krishnan; 10 exs., Hanakere, 27.ii.1999, Coll. S. Krishnan; 1 ex., Basavanagodu, 28.ii.1999, Coll. S. Krishnan; 10.exs., Duruguru, 29.ii.1999, Coll. S. Krishnan, 18 exs., Hanakere, 1.iii.1999, Coll. S. Krishnan; 21 exs., near Checkpost, Chaamraj Nagar to K. gudi road, 2.iii.1999, Coll. S. Krishnan; 7 exs., Kalani Road, 2.iv.1999, Coll. G. Thirumalai; 2 exs., Doddasempige, 2.iii. 1999, Coll. G. Thirumalai; 4 exs., Dorsanialla, 7.iv.2000, Coll. S. Krishnan; 4 exs., Nallur, 8.iv.2000, Coll. S. Krishnan, 18 exs., Krishnankette, 11.iv.2000, Coll. S. Krishnan.

Measurements : Snout-vent length : 19.5–50 mm.

Remarks : Widely distributed, commonest Skipper frog.

11. *Rana hexadactyla* Lesson
[= *Euphlyctis hexadactylus* (Lesson)]

1834. *Rana hexadactyla* Lesson, In *Belang, Voy. India Orient. Zool.*, : 331

1920. *Rana hexadactyla* Boulenger, *Rec. Indian Mus.*, xx : 10.

Diagnostic Characters : Medium to large size; tympanum large, distinct; snout obtusely pointed; inter orbital space very narrow; papilla on tongue absent; vomerine teeth present; dorsum smooth, two rows porous warts on flanks; fingers free, toes fully webbed, a prominent digitiform inner metatarsal tubercle present, digital discs absent.

Material examined : 5 exs., near Checkpost, from Chaamrajnagar to K. gudi, 2.iii.1999, Coll. S. Krishnan.

Measurements : Snout-vent length : 15-55 mm.

Remarks : Legs are of food value; prized laboratory experiment animal.

12. *Rana keralensis* Dubois
[= *Fejervarya keralensis* (Dubois)]

1875. *Rana verrucosa* Gunther, *Proc. Zool. Soc., London*, 567.

1980. *Rana keralensis* Dubois, *Bull. Mus. Natt. Hist. Nat.*, Paris 4(2) : 928.

Diagnostic Characters : Small to medium-sized frog; tympanum distinct; snout obtuse; interorbital space narrow; papilla on tongue absent; vomerine teeth present; dorsum rough with warts of unequal size and folds; fingers free; toes three-fourths webbed; digital discs absent; dorsum olive brown and a distinct 'V' marking present between the eyes.

Material examined : 2 exs., Budipaduga, 18.ii.1999, Coll. S.Krishnan; 1 exs., Bedaguli, 20.ii.1999, Coll. S. Krishnan; 1.ex., Kadakkinagandi, 21.ii.1999, Coll. S. Krishnan, 3 exs., Kombarmathi, 26.ii.1999, Coll. S. Krishnan; 1.exs., Duruguru, 29.ii.1999, Coll. S. Krishnan; 2 exs., Budipaduga,7.iv.2000, Coll. S. Krishnan.

Measurements : Snout-vent length : 20-45.5 mm.

13. *Rana limnocharis* Boie

[= *Fejervarya limnocharis* (Gravenhorst)]

1835. *Rana limnocharis* Boie, In Wiegmann, *Nova Acta Acad. Caesar Leop. Carol, Halle.*, XVII, I : 255.

1975. *Rana limnocharis* Daniel, *J. Bombay nat. Hist. Soc.*, 72(2) : 515.

Diagnostic Characters : Small-sized frogs, snout rounded or pointed; tympanum distinct; interorbital space narrow; papilla on tongue absent; vomerine teeth present, dorsum rough with more or less prominent warts and short longitudinal glandular folds; tibio-tarsal articulation of depressed limb reaches nostril or a little beyond; outer metatarsal united in the basal half; fingers free; toes usually half-webbed; digital discs absent.

Material examined : 4 exs., Budipaduga, 18.ii.1999, Coll.: S. Krishnan, 7 exs., Bedaguli, 20.ii.1999, Coll. S. Krishnan, 3 exs., Kadakkinagandi, 21.ii.1999, Coll. S. Krishnan, 2 exs, 7 km from K. gudi to Biligiri Ranganpetta, 24.ii.1999, Coll. S. Krishnan; 10 exs., Doddasempige, 25.ii.1999, Coll. S. Krishnan, 15.exs., Hanakere, 27.ii.1999, Coll. S. Krishnan, 1.ex., Dorsanialla, 7.iv.2000, Coll. S. Krishnan; 5 exs., Gombaekalpodu, 9.iv.2000, Coll. S. Krishnan, 15 exs., Krishnankette, 11.iv.2000, Coll. S. Krishnan.

Measurements : Snout-vent length : 11-47 mm.

14. *Rana temporalis* (Gunther)

[= *Rana (Sylvirana) temporalis* (Gunther)]

1864. *Hylorana temporalis* Gunther, *Rept. Brit. India* : 427

1989. *Rana temporalis* Daniel and Sekar, *J. Bombay nat. Hist. Soc.*, 86(2) : 197.

Diagnostic Characters : Medium to moderately large frogs; snout rounded or slightly pointed; tympanum very distinct; interorbital space broader than upper eyelid; papilla on tongue absent; vomerine teeth present; skin normally smooth; dorsolateral glandular folds prominent; fingers free; toes three-fours webbed; tips of both finger and toe enlarged to

form discs bearing marginal grooves; dorsum grey, brown or dark brown, rarely with small round spots; flanks dark brown.

Material examined : 1 ex., Bedaguli, 20.ii.1999, Coll. S. Krishnan; 2 exs., Kombarmathi, 26.ii.1999, Coll. S. Krishnan; 1 ex., Dorasanialla, 7.iv.2000, Coll. S. Krishnan.

Measurements : Snout-vent length : 19.0-59.5 mm.

Remarks : Due to a large number of morphological variations this taxon needs revision.

15. *Rana tigerina* Daudin
[= *Hoplobatrachus tigerinus* (Daudin)]

1803. *Rana tigerina* Daudin, *Hist. Rain. Gren. Crap.* : 64

2002. *Rana tigerina* Chanda, S.K. *Hand Book-Indian Amphibians*, : 136.

Diagnostic Characters : Large sized bull frog, snout more or less pointed, head moderately large, tympanum distinct with fold of skin, inter orbital space narrow, papilla on tongue absent, vomerine teeth present, dorsum with distinct longitudinal glandular folds and skin characteristically yellow or olive banded, heels overlap when limbs are folded at right angles to body, inner metatarsal tubercle small and obtuse, fingers free, toes fully webbed, digital discs absent.

Material examined : 1 ex., Kadakkinagandi, 21.ii.1999, Coll.: S. Krishnan; 2exs., near Checkpost, Chamraj Nagar to K.gudi, 2.iii.1999, Coll. S. Krishnan, 2 exs., Foot Hill of K. gudi, 1.iii.2000, Coll. G. Thirumalai; 2 exs., Budipaduga, 7.iv.2000, Coll. S. Krishnan.

Measurements : Snout-vent length : 44-62.5 mm.

Remarks : Of high commercial value as edible product.

16. *Tomopterna breviceps* (Schneider)
[= *Tompterna (Sphaerotheca) breviceps* (Schneider)]

1799. *Rana breviceps* Schneider, *Hist. Amph.*, 1 : 140.

1985. *Tomopterna breviceps* Frost, *Amphibian species of the World*, : 523.

Diagnostic Characters : Medium sized burrowing frogs with snout shorter than eye, inter orbital space broad, tympanum distinct; tibio-tarsal articulation of adspersed limb reaching shoulder, inner metatarsal tubercles longer and used for digging soil; outer metatarsal tubercle absent; dorsum brightly coloured with oval brown blotches.

Material examined : 1 ex., Budipaduga, 18.ii.1999, Coll. S. Krishnan; 1 ex., Nallur, 8.iv.2000, Coll. S. Krishnan; 1 ex., Gombaekalpodu, 9.iv.2000, Coll. S. Krishnan.

Measurements : Snout-vent length : 18-27.5 mm.

Family RHACOPHORIDAE

17. *Philautus glandulosus* (Jerdon)

1853. *Ixalus glandulosus* Jerdon, *J. Asiatic Soc. Bengal*, xxii : 532

1882. *Ixallus glandulosus* Boulenger, *Cat. Batr. Sal. Brit. Mus.*, 103.

Diagnostic Characters : Small frog; digits with intercalary cartilage between the two digital phalanges; tympanum hidden; pupil horizontal; dorso-lateral glandular fold absent; lingual papilla present; vomerine teeth absent, fingers free, toes webbed at base, digit with discs bearing very narrow circum-marginal grooves; dorsum of uniform dark brown with indistinct markings or grayish brown with dark brown 'X' markings, arms with light cross bars.

Material examined : 1 ex., Doddasempige, 25.ii.1999, Coll. S. Krishnan; 7 exs., Basavanagodu, 28.ii.1999, Coll. S. Krishnan; 5 exs., Hanakere, 1.iii.1999, Coll. S. Krishnan.

Measurements : Snout-vent length : 13-22.5 mm.

Remarks : Nomenclatural tangles exist in this taxon. Several uncertainties exist in allocating this taxon to another by synonymy. The Philautus complex consisting of *P. pulcher* (Boulenger, 1882), *P. noblei* (Ahl, 1927), *P. pulcherrimus* (Ahl, 1931), *P. punctatus* (Anderson, 1871), *P. montanus* (unther, 1876), *P. melanensis* Rao, 1937 and *P. tinniens* (Jerdon, 1853) has to be resolved before arriving at any specific allocation. Pending further work, we refrain from assigning the samples to another species.

18. *Philautus leucorhinus* (Lichtenstein and Martens)

1856. *Ixalus leucorhinus* Lichtenstein and Martens, *Nomencl. Rept. Mus. Berol.*, : 36

1890. *Ixalus leucorhinus* Boulenger, *Fauna of Brit. India*, : 483.

Diagnostic Characters : Small frog; digits with an intercalary cartilage between distal phalanges; vomerine teeth and lingual papilla absent; tympanum distinct, half the diameter of eye; throat smooth; fingers free; toes one-third or half webbed; light brown above, a distinctive triangular whitish spot on the snout.

Material examined : 3 exs., Basavanagodu, 28.ii.1999, Coll. S. Krishnan; 2 exs., Duruguru, 29.ii.1999, Coll. S. Krishnan; 3 exs., Hanakere, 1.iii.1999, Coll. S. Krishnan.

Measurements : Snout-vent length : 11.0-23.0 mm.

19. *Polypedates maculatus* (Gray)

1834. *Hyla maculata* Gray, *Illustr. Indian Zool.*, 1 : pl. 82.

1989. *Polypedates maculatus*, Daniel and Sekar, *J. Bombay nat. Hist. Soc.*, 86(2) : 199.

Diagnostic Characters : Fairly large sized frog, digits with an intercalary cartilage between ultimate and penultimate phalanges; vomerine teeth present, lingual papilla absent; canthus rostralis distinct, snout a little longer than diameter of orbit; nostril much closer to snout than to eye; fingers with rudiments of web; tibio-tarsal articulation reaching anterior margin of eye or a little beyond; toes two-thirds webbed; dorsum light brown or yellowish grey with or without darker spots and markings; limbs with dark crossbars, back of thigh with circular or polygonal yellowish markings.

Material examined : 1 ex., Seebinakare, 7.iv.2000, Coll. S. Krishnan; 1.ex., Gombaekalpodu, 9.iv.2000, Coll. S. Krishnan.

Remarks : Dubois (1987) considers this nomen a group of several widely distributed species in India due to a variety of colour and morphological variations.

SUMMARY

An analysis of collected specimens and literature review reveals the presence of atleast 19 species of Anurans in the Biligiri Rangaswamy Temple Wildlife Sanctuary. Our work relates to the occurrence of one species of the family Bofonidae, 4 species of the family Microhylidae, 11 species of Ranidae and 3 species of Rhacophoridae. Out of the 16 species of Ranidae known to occur in the state of Karnataka (Chanda, 2002), 11 species occur in Biligiri Rangaswamy Temple Wildlife Sanctuary as the major component. In addition, a new species described by Dutta & Ray (2000) as *Microhyla sholigari* appears to be endemic to Western Ghats. Other suspected endemics are 1. *Micrixalus opisthorhodus* (=*M. phyllophilus*), 2. *Myctibatrachus major*, 3. *Rana beddomii* (=*Indirana beddomii*), 4. *Rana curtipes* (= *Rana (Clinotarsus) curtipes*) and 5. *Philautus glandulosus*.

A qualitative analysis of the collected samples throws light on specks of amphibian diversity in the Biligiri Rangaswamy Temple Wildlife Sanctuary. From the 18 localities surveyed, Hanakere appears to hold the richest diversity (8 species) followed by Doddapigae, Duruguru (7 species each), Budipaduga (6 species), Gombaekalpodu, Kombaramathi, Basavana godu (5 species each), Dorasanialla, Bedaguli (4 species each), 7 km point from K. gudi, Nallur, Checkpost, Kadakkinagandi and Krishna Kettai (3 species each). Based on the foregoing it is inferred that more studies and survey should be conducted to systematically assess the biotic potential of Amphibian fauna of the conservation area.

REFERENCES

- BIJU, S. D. 2001. A synopsis to the frog fauna of the Western Ghats. Occasional publication I, ISCB : 1-24.
- BOSSUYT, F & A. DUBOIS. 2001. A review of the genus *Philautus* Gistel, 1848 (Amphibia, Anura, Ranidae, Rhacophoridae). *Zeylanica*, 6(1) : 1-112.

- BOULENGER, G.A. 1882. Catalogue of the Batrachia Salientia *S. caudata* in the collection of the British Museum, London 2nd Ed., : Xvi+503.
- BOULENGER, G.A. 1890. The fauna of British India, including Ceylon and Burma. Reptilia and Batrachia. Taylor and Francis, London, : XVIII + 541.
- BOULENGER, G.A. 1920. A monograph of the South Asian, Papuan, Melanesian and Australian frogs of the genus *Rana*. *Rec. Indian Mus.*, Calcutta, : 1-226.
- CHANDA, S.K. and DEUTI, K. 1997. Endemic amphibians of India. *Rec. zool. Surv. India*, 96(1-4) : 63-79.
- DAS, I. & CHANDA, S.K. 1998. A new species of *Philautus* (Annura : Rhacophoridae) from the Eastern Ghats, South-Eastern India. *J. South Asian nat. Hist.*, 3(1) : 103-112.
- DAS, I & DUTTA, S.K. 1998. Checklist of amphibians of India, with English common names. *Hamadryad*, 23(1) : 50-55.
- DUTTA, S. K. & RAY, P. 2000. *Microhyla sholigari*, a new species of microhylid frog (Anura : Microhylidae) from Karnataka, India. *Hamadryad*, 25(1) : 38-44.
- DANIELS, R.J. 1992. Geographical Distribution patterns of amphibians in the Western Ghats, India. *J. biogeogr.*, 19 : 521-529.
- INGER, R.F. & DUTTA, S.K. 1986. An overview of the amphibian fauna of India. *J. Bombay nat. Hist. Soc.*, 83 : 135-146.
- PILLAI, R.S. 1978. A new frog of the genus *Micrixalus* Boulenger from Wynad, S.india. *Proc. Indian Acad. Sci.*, (3)87 : 173-177.
- PILLAI, R.S. 1986. Amphibian fauna of Silent Valley, Kerala. *Rec. zool. Surv. India*, 84(1-4) : 229-242.
- RAVICHANDRAN, M.S. 2001. (NBR) Amphibia. *Fauna of Nilgiri Biosphere Reserve. Conservation Area Series*, 11 : 225-238.

REPTILIA

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INTRODUCTION

In order to gain an insight into the faunal composition of the Biligiri Rangaswamy Hills, the Southern Regional Station of the Zoological Survey of India has conducted a survey of the hills and forested tracts of the area during 1999-2000. The present paper constitutes results of the studies so far completed on some 20 reptiles collected during the survey. Although the Material discussed herein is small in terms of quantity, this paper assumes significance because it is the first authentic document on the reptile fauna of the Biligiri Rangaswamy Temple Hills which have been imperfectly known zoologically thus far. However, a definitive statement on the herpetology of the area should await further faunistic explorations which are contemplated.

To work out the Material, the faunal volumes of M. A. Smith (1931, 1935, 1943) and the papers published by the senior author (1985, 1990) on the subject were consulted. The arrangement of the list of species reflects the recent changes made in the nomenclature of the reptiles of India.

Key to the abbreviations : SL-Shell length; SVL-Snout to vent length; TL- Tail length; L- Length; Coll.- Collector/Collected by.

SYSTEMATIC LIST

TURTLES

Class REPTILIA

Order TESTUDINES

Family BATAGURIDAE

1. *Melanochelys trijuga trijuga* (Schweigger)

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LIZARDS

Order SQUAMATA

Suborder SAURIA

Family GEKKONIDAE

2. *Cnemaspis indica* (Gray)3. *Calotes versicolor* (Daudin)4. *Psammophilus dorsalis* (Gray)

Family SCINCIDAE

5. *Mabuya carinata* (Schneider)6. *Lygosoma punctatus* (Gmelin)**SNAKES**

Family TYPHLOPIDAE

7. *Ramphotyphlops braminus* (Daudin)8. *Typhlops porrectus* Stoliczka

Family COLUBRIDAE

9. *Oligodon taeniolatus* (Jerdon)10. *Xenochrophis piscator* (Schneider)11. *Amphiesma stolata* (Linnaeus)

Family VIPERIDAE

12. *Boiga trigonatus* (Schneider)13. *Trimeresurus gramineus* (Shaw)**SYSTEMATIC ACCOUNT****TURTLES**

Class REPTLIA

Order TESTUDINES

Family BATAGURIDAE

1. *Melanochelys trijuga trijuga* (Schweigger)
Peninsular black turtle1931. *Melanochelys trijuga trijuga*, Smith, *Fauna of British India*, I : 96.2001. *Melanochelys trijuga trijuga*, Murthy, *Fauna of Nilgiri Biosphere Reserve, Conservation Area Series*, 11 : 240

Material : 1 example (SL. 140 mm), K. Gudi, 29.ii.2000, G. Thirumalai, Coll.

Distribution : Endemic to India. Restricted to the Eastern Ghats and the Deccan Plateau. The present range of the species includes the States of Tamilnadu, Andhra Pradesh, Karnataka, Maharashtra and Gujarat.

LIZARDS

Order SQUAMATA

Suborder SAURIA

Family GEKKONIDAE

2. *Cnemaspis indica* (Gray)
Nilgiri dwarf gecko

1935. *Cnemaspis indica*, Smith, *Fauna of British India*, II : 68.

1985. *Cnemaspis indica*, Murthy, *Rec. zool. Surv. India, Occ. Pap. No., 72* : 19.

Material: 2 examples (SVL. 33 mm; TL.36 mm), Sebinakare to Doraisami Park, 7.ii.2000, G. Thirumalai, Coll.

Distribution : Restricted to the Western Ghats: Nilgiris, Kodagu (Coorg). The commonest dwarf gecko of the Nilgiris.

3. *Calotes versicolor* (Daudin)
Indian garden lizard

1935. *Calotes versicolor*, Smith, *Fauna of British India*, II : 188.

1985. *Calotes versicolor*, Murthy, *Rec. zool. Surv. India, Occ. Pap. No., 72* : 34.

Material : 3 examples (SVL.60 mm; TL. 132 mm), Anjeri (Kollur), 11.iv.1999, G. Thirumalai, Coll.; 2 examples (SVL. 70 mm; TL. 170 mm), Anjeri Mavinkar, 13.iv.1999, G. Thirumalai, Coll.; 1 example (SVL. 40mm; TL. 95mm), Road to Handia, 16.iv.1999, G. Thirumalai, Coll.; 2 example (SVL. 78 mm; TL. 173 mm), Sebinakare to Doraisamy park, 7.ii.2000, G. Thirumalai, Coll.; 1 example (SVL. 60 mm; TL. 140 mm), Parashukatta to Pudipaduga, 28.ii.2000, G. Thirumalai, Coll. 2 examples (SVL. 70 mm; TL. 178 mm), K. gudi, 7.iv.2000, S. Krishnan, Coll.

Distribution : Throughout India.

4. *Psammophilus dorsalis* (Gray)
Southern rock lizard

1935. *Psammophilus dorsalis*, Smith, *Fauna of British India*, II : 209.

1985. *Psammophilus dorsalis*, Murthy, Rec. zool. Surv. India, Occ. Pap. No., 72 : 37.

Material: 1 example (SVL. 70mm; TL. 155 mm), Road to Sebinakare, 4.iv.1999, G. Thirumalai, Coll.

Distribution : Endemic to India. Recorded from southern India, Bihar, Orissa and Madhya Pradesh. Plentiful in some parts of the Nilgiris, Western Ghats. Reported to be abundant in the neighborhood of Bangalore.

Remarks : The specimen picked up seems to be an adult male, displaying a crimson colored head and forebody.

Family SCINCIDAE

5. *Mabuya carinata* (Schneider) **Common skink**

1935. *Mabuya carinata*, Smith, Fauna of British India, II : 266.

1985. *Mabuya carinata*, Murthy, Rec. zool. Surv. India, Occ. Pap. No., 72 : 40.

Material: 2 examples (SVL. 59mm; TL. 33 mm), Anjeri (Kollur), 11.iv.1999, G. Thirumalai, Coll.

Distribution : The whole of India except the extreme northwest.

6. *Lygosoma punctata* (Gmelin) **Dotted garden skink**

1935. *Riopa punctata* : Smith, Fauna of British India, II : 318-319.

Material : 1 example (SVL. 42mm; TL. 55 mm), 7km from K. Gudi to Bilgiri, 24.ii.1999, G. Thirumalai, Coll.

Distribution : Throughout India.

SNAKES

Family TYPHLOPIDAE

7. *Ramphotyphlops braminus* (Daudin) **Common blind snake**

1943. *Typhlops braminus*, Smith, Faunak of British India, III : 46.

1990. *Ramphotyphlops braminus*, Murthy, Rec. zool. Surv. India, Occ. Pap. No., 114 : 5.

Material : 2 examples (L. 138 mm), Sebinakare to Doraisami Park, 27.xi.2000, G. Thirumalai, Coll.; 3 examples (L. 132 mm), Doddasampige, 2.iii.2000, G. Thirumalai, Coll.

Distribution : Throughout India, including the Andaman and Nicobar Islands and the Lakshadweep.

8. *Typhlops porrectus* Stoliczka
Slender blind snake

1943. *Typhlops porrectus*, Smith, *Fauna of British India*, III : 46.

Material : 2 examples (L.120mm) Road to Dodithagadu, 5.iv.1999, G. Thirumalai, Coll.

Distribution : Throughout India, but not so common like the preceding species.

Family COLUBRIDAE

9. *Oligodon taeniatus* (Jerdon)
Streaked kukri snake

1943. *Oligodon taeniatus*, Smith, *Fauna of British India*, III : 223

1990. *Oligodon taeniatus*, Murthy, *Rec. zool. Surv. India, Occ. Pap. No., 114* : 31.

Material: 1 example (L. 325mm), Biligiri Rangaswamy Temple Hills, 29.ii.2000, G. Thirumalai, Coll.

Distribution : Throughout India.

10. *Xenochrophis piscator* (Schneider)
Checkered keelback

1943. *Natrix hiscator*, Smith, *Fauna of British India*, III : 293.

1990. *Xenochrophis piscator*, Murthy, *Rec. zool. Surv. India, Occ. Pap. No., 114* : 43.

Material : 1 example (L. 265mm), Foothills to K. gudi, 1.iii.2000, G. Thirumalai, Coll.

Distribution : Throughout India.

11. *Amphiesma stolata* (Linnaeus)
Buff-striped keelback

1943. *Natrix stolata* Smith, *Fauna of British India*, III : 303

1990. *Amphiesma stolata*, Murthy, *Rec. zool. Surv. India, Occ. Pap. No., 114* : 40.

Material: 1 example (L. 800mm), Doddachempike, 2.iii.2000, G. Thirumalai, Coll.

Distribution : Throughout India.

**12. *Boiga trigonatus* (Schreider)
Common cat snake**

1943. *Boiga trigonata*, Smith, *Fauna of British India*, III : 349
 1990. *Boiga trigonata*, Murthy, *Rec. zool. Surv. India, Occ. Pap. No., 114* : 47.

Material : 1 example (L. 500mm), K. gudi-Sebinakare, 7.iv.2000, S. Krishnan, Coll.

Distribution : Throughout India.

Family VIPERIDAE

**13. *Trimeresurus gramineus* (Shaw)
Bamboo pit viper**

1943. *Trimeresurus gramineus* Smith, *Fauna of British India*, III : 505.
 1990. *Trimeresurus gramineus*, Murthy, *Rec. zool. Surv. India, Occ. Pap. No., 114* : 62.

Material : 1 example (L. 440mm), Road to Dodithagadu, 5.x.1999, G. Thirumalai, Coll.

Distribution : Found in most of the hilly terrain of West Bengal, Gujarat and Peninsular India, south of lat. 22°. Common at Castle Rock, Uttara Kannada District, Karnataka.

REFERENCES

- MURTHY, T. S. N. 1985. A field guide to the lizards of Western Ghats, India. *Rec. zool. Surv. India. Occ. Paper No., 72* : 1-51pp., text- figs, pls.
- MURTHY, T. S. N. 1990. Illustrated guide to the snakes of the Western Ghats, India. *Rec. zool. Surv. India. Occ. Paper No., 114* : 1-76 pp; 57b/w plates, 10 text figs and 11 col. Plates.
- SMITH, M. A. 1931. *The fauna of British India including Ceylon and Burma: Reptilia and Amphibia. Vol I. Loricata, Testudines*. Taylor and Francis, London. (Reprinted 1974, 1995 by Today & Tomorrow's Printers and Publishers, New Delhi).
- SMITH, M. A. 1935. *The fauna of British India including Ceylon and Burma: Reptilia and Amphibia. Vol II. Sauria*. Taylor and Francis, London. (Reprinted 1974, 1995 by Today & Tomorrow's Printers and Publishers, New Delhi).
- SMITH, M. A. 1943. *The fauna of British India including Ceylon and Burma : Reptilia and Amphibia. Vol III. Serpentes*. Taylor and Francis, London. (Reprinted 1974, 1995 by Today & Tomorrow's Printers and Publishers, New Delhi).

AVES

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INTRODUCTION

There are several records on the avifauna of Biligiri Rangaswamy Temple Wildlife Sanctuary. First and foremost is by British naturalist, R.C. Morris who published a couple of papers on avifauna of Biligiri Rangaswamy Temple Wildlife Sanctuary (Morris 1927, 1939). Salim Ali surveyed erstwhile Mysore district as a part of his effort to document bird life of India and covered Biligiri Rangaswamy Temple Wildlife Sanctuary (1942 a, b; 1943 a,b,c). Since then, there have been several surveys and additions to the bird list (Baskaran 1992, Karthikeyan *et al.* 1995, Srinivasa *et al.* 1997, Jayadeva, (pers. Comm.) and Uttangi, 2000). Recently Aravind *et al.* (2001) made several new additions to the bird list of Biligiri Rangaswamy Temple Wildlife Sanctuary.

We conducted surveys to document bird diversity of Biligiri Rangaswamy Temple Wildlife Sanctuary from 1998 to 2000. All the major and minor habitat types found in and around Sanctuary were covered and birds seen were recorded. They were identified based on The Hand Book of Birds of India and Pakistan (Ali and Ripley, 1985) and the nomenclature follows Manakdan & Pitte (2001).

OBSERVATIONS

A total of 248 species of birds are recorded from the sanctuary till date. Detailed list of species recorded along with the status, occurrence, and habitats are given in Table 1. The species recorded belong to 19 orders and 53 families and 157 genera. Of them, 118 were non-passerines and 131 were passerines (Table 1). The birds were classified into very common, common, uncommon and rare based on number of individuals seen and number of times the species were recorded from our surveys and form previous records. The species were considered as rare when the bird is sighted less than five times and also occurred in low abundance; those seen less than 15 times were considered as uncommon and those with high and very high encounter rate and abundance were treated as common and very common. Based on this, 33 species are rare, 60 species are uncommon, 117 species common and 39 species are very common. The bird assemblage comprises of 47 migratory species, six local migratory and 196 resident species. 29 are water birds.

Table : List of bird species found in Biligiri Rangaswamy Temple Wildlife Sanctuary.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
1.	Order PODICIPITIFORMES Family PODICIPIDAE Little Grebe	<i>Tachybaptus ruficollis</i> (Pallas, 1764)	C	R	P
2.	Order PELECANIFORMES Family PHALACROCORACIDAE Great Cormorant	<i>Phalacrocorax carbo</i> (Linnaeus, 1758)	R	LM	P
3.	Little Cormorant	<i>Phalacrocorax niger</i> (Vieillot, 1817)	C	LM	P
4.	Order CICONIIFORMES Family ARDEIDAE Grey Heron	<i>Ardea cinerea</i> Linnaeus, 1758	UC	R	P
5.	Little Green Heron	<i>Butorides striatus</i> (Linnaeus, 1758)	R	R	P
6.	Pond Heron or Paddybird	<i>Ardeola grayii</i> (Sykes, 1832)	VC	R	P, F
7.	Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus, 1758)	C	R	P, F
8.	Large Egret	<i>Casmerodius albus</i> (Linnaeus, 1758)	R	R	P
9.	Median Egret	<i>Mesophoyx intermedia</i> (Wagler, 1829)	R	R	P, F
10.	Little Egret	<i>Egretta garzetta</i> (Linnaeus, 1756)	VC	R	P, F
11.	Family CICONIIDAE Painted Stork	<i>Mycteria leucocephala</i> (Pennant, 1769)	UC	LM	R
12.	White-necked Stork	<i>Ciconia episcopus</i> (Linnaeus, 1758)	UC	R	R
13.	Family THRESKIORNITHIDAE Oriental White Ibis	<i>Threskiornis melanocephalus</i> (Latham, 1790)	UC	LM	P,R
	Order ANSERIFORMES Family ANATIDAE				

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat#
14.	Bar-headed Goose	<i>Anser indicus</i> (Latham, 1790)	R	M	P
15.	Lesser Whistling-Duck	<i>Dendrocygna javanica</i> (Horsfield, 1821)	R	R	P
16.	Common Teal	<i>Anas crecca</i> Linnaeus, 1758	UC	M	P
17.	Spot-billed Duck	<i>Anas poecilorhyncha</i> J. R. Forester, 1781	C	R	P
	Order FALCONIFORMES				
	Family ACCIPITERIDAE				
18.	Black-shouldered Kite	<i>Elanus caeruleus</i> (Desfontaines, 1789)	UC	R	S,G
19.	Black Baza	<i>Aviceda leuphotes</i> (Dumont, 1820)	R	R	M
20.	Oriental Honey-Buzzard	<i>Pernis ptilorhynchus</i> (Temminck, 1821)	C	R	M
21.	Black Kite	<i>Milvus migrans</i> (Boddaert, 1783)	VC	R	S,H,F
22.	Brahminy Kite	<i>Haliastur indus</i> (Boddaert, 1783)	C	R	S,H,F
23.	Shikra	<i>Accipiter badius</i> (Gmelin, 1788)	C	R	M,D
24.	Besra Sparrowhawk	<i>Accipiter virgatus</i> (Temminck, 1822)	C	R	E,M,D
25.	Changeable Hawk-Eagle	<i>Spizaetus cirrhatus</i> (Gmelin, 1788)	C	R	M,D
26.	Rufous-bellied Eagle	<i>Hieraetus kienerii</i> (E. Geoffroy, 1835)	UC	R	M,D
27.	Tawny Eagle	<i>Aquila rapax</i> (Temminck, 1828)	R	R	E
28.	Black Eagle	<i>Ictinaetus malayensis</i> (Temminck, 1822)	C	R	E,M,D,S
29.	Indian White-backed Vulture	<i>Gyps bengalensis</i> (Gmelin, 1788)	R	R	S,H,F
30.	Egyptian Vulture	<i>Neophron percnopterus</i> (Linnaeus, 1758)	R	R	S,F
31.	Hen Harrier	<i>Circus cyaneus</i> (Linnaeus, 1766)	R	M	F
32.	Western Marsh-Harrier	<i>Circus aeruginosus</i> (Linnaeus, 1758)	UC	M	P,F,H
33.	Short-Toed Snake-Eagle	<i>Circaetus gallicus</i> (Gmelin, 1788)	UC	R	E,M,D
34.	Crested Serpent-Eagle	<i>Spilornis cheela</i> (Latham, 1790)	VC	R	E,M,D,S

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
	Family PANDIONIDAE				
35.	Osprey	<i>Pandion haliaetus</i> (Linnaeus, 1758)	UC	M	P,R
	Family FALCONIDAE				
36.	Peregrine Falcon	<i>Falco peregrinus</i> Tunstall, 1771	C	M	D,GS
37.	Lesser Kestrel	<i>Falco naumanni</i> Fleischer, 1818	R	M	GS
38.	Common Kestrel	<i>Falco tinnunculus</i> Linnaeus, 1758	C	M	GS
	Order GALLIFORMES				
	Family PHASIANIDAE				
39.	Grey Francolin	<i>Francolinus pondicerianus</i> (Gmelin, 1789)	C	R	M,D,S,H,F
40.	Jungle Bush-Quail	<i>Perdicula asiatica</i> (Latham, 1790)	C	R	M,D
41.	Painted Bush-Quail	<i>Perdicula erythrorhyncha</i> (Sykes, 1832)	UC	R	M,D
42.	Red Spurfowl	<i>Galloperdix spadicea</i> (Gmelin, 1789)	VC	R	M,D,S
43.	Painted Spurfowl	<i>Galloperdix lunulata</i> (Valenciennes, 1825)	UC	R	M
44.	Grey Junglefowl	<i>Gallus sonneratii</i> Temminck, 1813	VC	R	M,D,S
45.	Indian Peafowl	<i>Pavo cristatus</i> Linnaeus, 1758	C	R	S
	Order GRUIFORMES				
	Family TURNICIDAE				
46.	Yellowlegged Button Quail	<i>Turnix tanki</i> Blyth, 1843	UC	R	S
	Family RALLIDAE				
47.	Slaty-legged Crake	<i>Rallina eurizonoides</i> (Lafresnaye, 1845)	R	R	P
48.	White-breasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant, 1769)	C	R	P,F,H
	Order CHARADRIIFORMES				
	Family JACANIDAE				

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat#
49.	Bronze-winged Jacana	<i>Metopidius indicus</i> (Latham, 1790)	C	R	P
	Family CHARADRIIDAE				
50.	Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert, 1783)	C	R	S,H,F
51.	Yellow-wattled Lapwing	<i>Vanellus malabaricus</i> (Boddaert, 1783)	UC	R	S,F,Ri
	Family SCOLOPACIDAE				
52.	Green Sandpiper	<i>Tringa ochropus</i> Linnaeus, 1758	C	M	P,F,Ri
53.	Common Sandpiper	<i>Actitis hypoleucus</i> Linnaeus, 1758	C	M	P,F,Ri
54.	Pintail Snipe	<i>Gallinago stenura</i> (Bonaparte, 1830)	UC	M	P,F,Ri
55.	Common Snipe	<i>Gallinago gallinago</i> (Linnaeus, 1758)	UC	M	P,F,Ri
56.	Eurasian Woodcock	<i>Scolopax rusticola</i> Linnaeus, 1758	R	M	F,Ri
	Family RECURVIROSTRIDAE				
57.	Black-winged Stilt	<i>Himantopus himantopus</i> (Linnaeus, 1758)	UC	M	P,R
	Family BURHINIDAE				
58.	Stone-Curlew	<i>Burhinus oedicnemus</i> (Linnaeus, 1758)	UC	R	S
	Family LARIDAE				
59.	Whiskered Tern	<i>Chlidonias hybridus</i> (Pallas, 1811)	UC	R	P,Ri
	Order COLUMBIIFORMES				
	Family COLUMBIDAE				
60.	Pompadour Green-Pigeon	<i>Treron pompadoura</i> (Gmelin, 1789)	UC	R	M,D
61.	Yellow-legged Green-Pigeon	<i>Treron phoenicoptera</i> (Latham, 1790)	C	R	M,E
62.	Green Imperial-Pigeon	<i>Ducula aenea</i> (Linnaeus, 1766)	C	R	M,D,S
63.	Mountain Imperial-Pigeon	<i>Ducula badia</i> (Raffles, 1822)	C	R	E,GS
64.	Blue Rock Pigeon	<i>Columba livia</i> Gmelin, 1789	C	R	F,H,S

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat#
65.	Nilgiri Wood-Pigeon	<i>Columba elphinstonii</i> (Sykes, 1833)	UC	R	M,E
66.	Eurasian Collared-Dove	<i>Streptopelia decaocto</i> (Frivaldszky, 1838)	C	R	D,S,F
67.	Spotted Dove	<i>Streptopelia chinensis</i> (Scopoli, 1786)	VC	R	M,D,S, F,H
68.	Little Brown Dove	<i>Streptopelia senegalensis</i> (Linnaeus, 1766)	VC	R	D,S,F
69.	Emerald Dove	<i>Chalcophaps indica</i> (Linnaeus, 1758)	C	R	M,E,GS
Order PSITTACIFORMES					
Family PSITTACIDAE					
70.	Rose-ringed Parakeet	<i>Psittacula krameri</i> (Scopoli, 1769)	VC	R	E,GS,M, D,S,H,F
71.	Plum-headed Parakeet	<i>Psittacula cyanocephala</i> (Linnaeus, 1766)	VC	R	E,GS,M, D,H,F
72.	Blue-winged Parakeet	<i>Psittacula columboides</i> (Vigors, 1830)	VC	R	M,E,GS
73.	Indian Hanging-Parrot	<i>Loriculus vernalis</i> (Sparrman, 1787)	C	R	E,GS, M,H
Order CUCULIFORMES					
Family CUCULIDAE					
74.	Pied Crested Cuckoo	<i>Clamator jacobinus</i> (Boddaert, 1783)	C	M	M,D,S
75.	Large Hawk-Cuckoo	<i>Hierococcyx sparverioides</i> (Vigors, 1832)	UC	M	M,D,S
76.	Brainfever Bird	<i>Hierococcyx varius</i> (Vahl, 1797)	C	R	M,D, S,H
77.	Indian Cuckoo	<i>Cuculus micropterus</i> Gould, 1838	UC	LM	M,D,S
78.	Indian Plaintive Cuckoo	<i>Cacomantis passerinus</i> (Vahl, 1797)	C	LM	M,D,S

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
79.	Asian Koel	<i>Eudynamys scolopacea</i> (Linnaeus, 1758)	C	R	E,M,D, S,H
80.	Small Green-billed Malkoha	<i>Phaenicophaeus viridirostris</i> (Jerdon, 1840)	C	R	M,D, S,H
81.	Sirkeer Malkoha	<i>Phaenicophaeus leschenaultii</i> (Lesson, 1830)	UC	R	D,S
82.	Greater Coucal	<i>Centropus sinensis</i> (Stephens, 1815)	VC	R	E,M,D, S,H,F
	Order STRIGIFORMES				
	Family STRIGIDAE				
83.	Collared Scops-Owl	<i>Otus bakkamoena</i> Pennant, 1769	C	R	M
84.	Dusky Eagle-Owl	<i>Bubo coromandus</i> (Latham, 1790)	C	R	M
85.	Brown Fish-Owl	<i>Ketupa zeylonensis</i> (Gmelin, 1788)	C	R	M,E
86.	Jungle Owlet	<i>Glaucidium radiatum</i> (Tickell, 1833)	C	R	M,E
87.	Brown Hawk-Owl	<i>Ninox scutulata</i> (Raffles, 1822)	UC	R	M,E
88.	Spotted Owlet	<i>Athene brama</i> (Temminck, 1821)	C	R	M,D,S, H,F
89.	Mottled Wood-Owl	<i>Strix ocellata</i> (Lesson, 1839)	C	R	M
	Order CAPRIMULGIFORMES				
	Family CAPRIMULGIDAE				
90.	Indian Jungle Nightjar	<i>Caprimulgus indicus</i> Latham, 1790	C	R	E,M,D,S
91.	Long-tailed Nightjar	<i>Caprimulgus macrurus</i> Horsfield, 1821	UC	R	E,M
92.	Common Indian Nightjar	<i>Caprimulgus asiaticus</i> Latham, 1790	VC	R	M,D, S,H

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
	Order APODIFORMES				
	Family APODIDAE				
93.	Alpine Swift	<i>Tachymarptis melba</i> (Linnaeus, 1758)	UC	R	D,S,H,
94.	House Swift	<i>Apus affinis</i> (J. E. Gray, 1830)	C	R	S,H,F
	Family HEMIPROCNIDAE				
95.	Crested Treeswift	<i>Hemiprocne coronata</i> (Tickell, 1833)	C	R	E,M,D, S,H
	Order CORACIIFORMES				
	Family ALCEDINIDAE				
96.	Lesser Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus, 1758)	C	R	P,R
97.	Small Blue Kingfisher	<i>Alcedo atthis</i> (Linnaeus, 1758)	C	R	P,R,H
98.	Storkbilled Kingfisher	<i>Halcyon capensis</i> (Linnaeus, 1766)	R	R	P,R
99.	Whitebreasted Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus, 1758)	VC	R	M,D,S, F,H,P,R
	Family MEROPIDAE				
100.	Chestnut-headed Bee-eater	<i>Merops leschenaulti</i> Vieillot, 1817	UC	R	M
101.	Blue-tailed Bee-eater	<i>Merops philippinus</i> Linnaeus, 1766	R	R	D,S,H,F
102.	Small Bee-eater	<i>Merops orientalis</i> Latham, 1801	C	R	E,M,D, S,H,F
103.	Blue-bearded Bee-eater	<i>Nyctyornis athertoni</i> (Jardine & Selby, 1828)	UC	R	
	Family CORACIIDAE				
104.	Indian Roller	<i>Coracias benghalensis</i> (Linnaeus, 1758)	C	R	S,H,F

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
	Family UPUPIDAE				
105.	Common Hoopoe	<i>Upupa epops</i> Linnaeus, 1758	C	M	S,H,F
	Family BUCEROTIDAE				
106.	Indian Grey Hornbill	<i>Ocyceros birostris</i> (Scopoli, 1786)	UC	R	S,D,M
	Order PICIFORMES				
	Family MEGALAIMIDAE				
107.	brown-headed Barbet	<i>Megalaima zeylanica</i> (Gmelin, 1788)	C	R	E,GS,M
108.	White-cheeked Barbet	<i>Megalaima viridis</i> (Boddaert, 1783)	VC	R	E,GS,M, D,S,H
109.	Crimson-throated Barbet	<i>Megalaima rubricapilla</i> (Gmelin, 1788)	UC	R	M
110.	Coppersmith Barbet	<i>Megalaima haemacephala</i> (P.L.S. Muller, 1776)	C	R	E,GS, M,D,H
	Family PICIDAE				
111.	Rufous Woodpecker	<i>Celeus brachyurus</i> (Vieillot, 1818)	UC	R	E,M
112.	Little Scaly-bellied Green Woodpecker	<i>Picus xanthopygaeus</i> (J.E. Gray & G.R. Gray, 1846)	C	R	M,D,S
113.	Small Yellow-naped Woodpecker	<i>Picus chlorolophus</i> Vieillot, 1818	UC	R	M,D
114.	Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i> (Linnaeus, 1758)	VC	R	E,GS,M, D,S,H
115.	Common Golden-backed Woodpecker	<i>Dinopium javanense</i> (Ljungh, 1797)	C	R	E,M,D
116.	Yellow-fronted Pied Woodpecker	<i>Dendrocopos mahrattensis</i> (Latham, 1801)	C	R	E,M,D, S,H
117.	Brown-capped Pygmy Woodpecker	<i>Dendrocopos nanus</i> (Vigors, 1832)	C	R	E,M

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
118.	Greater Golden-backed Woodpecker Order PASSERIFORMES Family Pittidae	<i>Chrysocolaptes lucidus</i> (Scopoli, 1786)	UC	R	E,GS,M
119.	Indian Pitta Family ALAUDIDAE	<i>Pitta brachyura</i> (Linnaeus, 1766)	C	M	M,D,H
120.	Jerdon's Bush Lark	<i>Mirafra affinis</i> Blyth, 1845	UC	R	S,H
121.	Red-winged Bush-Lark	<i>Mirafra erythroptera</i> Blyth, 1845	C	R	S,F,H
122.	Ashy-crowned Sparrow-Lark	<i>Eremopterix grisea</i> (Scopoli, 1786)	C	R	S,F,H
123.	Rufous-tailed Finch-Lark	<i>Ammomanes phoenicurus</i> (Franklin, 1831)	C	R	S
124.	Malabar Crested Lark	<i>Galerida malabarica</i> (Scopoli, 1786)	UC	R	GS,M, D,H,F
	Family HIRUNDINIDAE				
125.	Dusky Crag-Martin	<i>Hirundo concolor</i> Sykes, 1833	C	R	S,H
126.	Common Swallow	<i>Hirundo rustica</i> Linnaeus, 1758	C	M	P,R,H,F
127.	Red-rumped Swallow	<i>Hirundo daurica</i> Linnaeus, 1771	C	R	P,R,H,F
	Family MOTACILLIDAE				
128.	Oriental Tree Pipit	<i>Anthus hodgsoni</i> Richmond, 1907	C	R	M,D
129.	Eurasian Tree Pipit	<i>Anthus trivialis</i> (Linnaeus, 1758)	UC	M	M,D
130.	Paddyfield Pipit	<i>Anthus novaeseelandiae</i> Vieillot, 1818	C	M	H,F
131.	Brown Rock Pipit	<i>Anthus similis</i> Jerdon, 1840	R	M	M,D
132.	Forest Wagtail	<i>Dendronanthus indicus</i> (Gmelin, 1789)	UC	M	M,D
133.	Yellow Wagtail	<i>Motacilla flava</i> Linnaeus, 1758	C	M	E,GS,M, D,S,H,F

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
134.	Grey Wagtail	<i>Motacilla cinerea</i> Tunstall, 1771	C	M	E,GS,M, D,S,H,F
135.	Large Pied Wagtail	<i>Motacilla maderaspatensis</i> Gmelin, 1789	VC	R	E,GS,M, D,S,H,F
	Family CAMPEPHAGIDAE				
136.	Pied Flycatcher Shrike	<i>Hemipus picatus</i> (Sykes, 1832)	C	R	E,M
137.	Large Woodshrike	<i>Tephrodornis gularis</i> (Raffles, 1832)	UC	R	E,M
138.	Common Woodshrike	<i>Tephrodornis pondicerianus</i> (Gmelin, 1789)	C	R	E,M
139.	Large Cuckoo-Shrike	<i>Coracina macei</i> (Lesson, 1830)	C	R	E,M,D
140.	Black-headed Cuckoo-Shrike	<i>Coracina melanoptera</i> (Ruppell, 1839)	C	R	E,M
141.	Scarlet Minivet	<i>Pericrocotus flammeus</i> (Forster, 1781)	VC	R	E,GS, M,D,S
142.	Rosy Minivet	<i>Pericrocotus roseus</i> (Vieillot, 1818)	R	R	M
143.	Small Minivet	<i>Pericrocotus cinnamomeus</i> (Linnaeus, 1766)	C	R	E,GS, M,D,S
	Family PYCNONOTIDAE				
144.	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i> (Linnaeus, 1758)	VC	R	E,GS,M, D,S,H,F
145.	Red-vented Bulbul	<i>Pycnonotus cafer</i> (Linnaeus, 1766)	VC	R	M,D,S, H,F
146.	Yellow-throated Bulbul	<i>Pycnonotus xantholaemus</i> (Jerdon, 1844)	R	R	D
147.	White-browed Bulbul	<i>Pycnonotus luteolus</i> (Lesson, 1841)	VC	R	D,S,H
148.	Yellow-browed Bulbul	<i>Iole indica</i> (Jerdon, 1839)	C	R	E,GS,M
149.	Black Bulbul	<i>Hypsipetes leucocephalus</i>	C	R	E,GS,M

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat#
		(P.L.S. Muller, 1776)			
150.	Family IRENIDAE Common Iora	<i>Aegithina tiphia</i> (Linnaeus, 1758)	VC	R	E,GS,M, D,S,H
151.	Gold-fronted Chloropsis	<i>Chloropsis aurifrons</i> (Temminck, 1829)	VC	R	E,GS,M, D,S,H
152.	Jerdon's Chloropsis	<i>Chloropsis cochinchinensis</i> (Gmelin, 1788)	UC	R	E,GS,M
153.	Asian Fairy-Bluebird	<i>Irena puella</i> (Latham, 1790)	UC	R	E,GS,M
	Family LANIIDAE				
154.	Bay-backed Shrike	<i>Lanius vittatus</i> Valenciennes, 1826	VC	R	S,D,M
155.	Rufous-backed Shrike	<i>Lanius schach</i> (Linnaeus, 1758)	C	R	M,D
156.	Brown Shrike	<i>Lanius cristatus</i> Linnaeus, 1758	UC	M	M,D,S
	Family MUSCICAPIDAE				
	Subfamily TURDINAE				
157.	Indian Blue Chat	<i>Luscinia brunnea</i> (Hodgson, 1837)	UC	M	E,GS
158.	Oriental Magpie Robin	<i>Copsychus saularis</i> (Linnaeus, 1758)	VC	R	M,D,S, H,F
159.	White-rumped Shama	<i>Copsychus malabaricus</i> (Scopoli, 1786)	UC	R	M
160.	Pied Bushchat	<i>Saxicola caprata</i> (Linnaeus, 1766)	C	R	H,F
161.	Indian Robin	<i>Saxicoloides fulicata</i> (Linnaeus, 1776)	VC	R	D,S,H,F
162.	Blue-headed Rock Thrush	<i>Monticola cinclorhynchus</i> (Vigors, 1832)	C	M	E,GS,M
163.	Blue Rock-Thrush	<i>Monticola solitarius</i> (Linnaeus, 1758)	UC	M	E,GS,M
164.	Malabar Whistling-Thrush	<i>Myiophonus horsfieldii</i> (Vigors, 1831)	C	R	E,GS,M

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat#
165.	Pied Thrush	<i>Zoothera wardii</i> (Blyth, 1842)	R	R	M
166.	Orange-headed Thrush	<i>Zoothera citrina</i> (Latham, 1790)	C	R	E, GD, M
167.	Scaly Thrush	<i>Zoothera dauma</i> (Latham, 1790)	R	M	E, GS
168.	Eurasian Blackbird	<i>Turdus merula</i> Linnaeus, 1758	R	R	E, GS, M
Subfamily TIMALIINAE					
169.	Spotted Babbler	<i>Pellorneum ruficeps</i> Swainson, 1832	UC	R	M
170.	Indian Scimitar-Babbler	<i>Pomatorhinus horsfieldii</i> Sykes, 1832	C	R	E, GS, M, D
171.	Rufous-bellied Babbler	<i>Dumetia hyperythra</i> (Franklin, 1831)	C	R	E, M, D
172.	Black-headed Babbler	<i>Rhopocichla atriceps</i> (Jerdon, 1839)	UC	R	E, GS
173.	Common Babbler	<i>Turdoides caudatus</i> (Dumont, 1823)	C	R	DS
174.	Indian Rufous Babbler	<i>Turdoides subrufus</i> (Jerdon, 1839)	C	R	M, D, H
175.	Jungle Babbler	<i>Turdoides striatus</i> (Dumont, 1823)	VC	R	E, M, D, H, F
176.	White-headed Babbler	<i>Turdoides affinis</i> (Jerdon, 1847)	VC	R	D, S, H, F
177.	Quaker Tit-Babbler	<i>Alcippe poioicephala</i> (Jerdon, 1844)	C	R	E, GS
Subfamily SYLVIINAE					
178.	Streaked Fantail-Warbler	<i>Cisticola juncidis</i> (Rafinesque, 1810)	UC	R	F
179.	Franklin's Prinia	<i>Prinia hodgsonii</i> Blyth, 1844	C	R	M, D, H
180.	Plain Prinia	<i>Prinia inornata</i> Sykes, 1832	C	R	H, F
181.	Ashy Prinia	<i>Prinia socialis</i> Sykes, 1832	C	R	D, H, F
182.	Jungle Prinia	<i>Prinia sylvatica</i> Jerdon, 1840	C	R	M, D, S
183.	Common Tailorbird	<i>Orthotomus sutorius</i> (Pennant, 1769)	VC	R	E, M, D, S, H, F

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
184.	Pale Grasshopper-Warbler	<i>Locustella naevia</i> (Boddaert, 1783)	R	R	GS
185.	Blyth's Reed-Warbler	<i>Acrocephalus dumetorum</i> Blyth, 1849	C	R	E,M,D, S,H,F
186.	Booted Warbler	<i>Hippolais caligata</i> (Lichtenstein, 1823)	C	M	M,D
187.	Orphean Warbler	<i>Sylvia hortensis</i> (Gmelin, 1789)	UC	M	D,S
188.	Common Lesser Whitethroat	<i>Sylvia curruca</i> (Linnaeus, 1758)	C	M	S
189.	Tickell's Warbler	<i>Phylloscopus affinis</i> (Tickell, 1833)	UC	M	E,GS,M, D,H
190.	Greenis Leaf-Warbler	<i>Phylloscopus trochiloides</i> (Sundevall, 1837)	C	M	E,GS,M
191.	Western Crowned Warbler	<i>Phylloscopus occipitalis</i> (Blyth, 1845)	C	M	E,GS
Subfamily MUSCICAPINAE					
192.	Asian Brown Flycatcher	<i>Muscicapa dauurica</i> Pallas, 1811	C	M	E,M
193.	Brown-breasted Flycatcher	<i>Muscicapa muttui</i> (Layard, 1854)	R	M	M
194.	Rusty-tailed Flycatcher	<i>Muscicapa ruficauda</i> Swainson, 1838	UC	M	E,M
195.	Red-throated Flycatcher	<i>Ficedula parva</i> (Bechstein, 1792)	R	M	M
196.	Black-and-orange Flycatcher	<i>Ficedula nigrorufa</i> (Jerdon, 1839)	R	R	E,GS
197.	Whitebellied Blue-Flycatcher	<i>Cyornis pallipes</i> (Jerdon, 1840)	UC	R	E
198.	Tickell's Blue-Flycatcher	<i>Cyornis tickelliae</i> Blyth, 1843	C	R	E,GS, M,D
199.	Verditer Flycatcher	<i>Eumyias thalassina</i> (Swainson, 1838)	UC	M	E,M
200.	Nilgiri Flycatcher	<i>Eumyias albicaudata</i> (Jerdon, 1840)	UC	M	E,GS
201.	Grey-headed Flycatcher	<i>Culicicapa ceylonensis</i> (Swainson, 1820)	C	R	E,GS,M

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat#
202.	Subfamily MONARCHINAE Asian Paradise-Flycatcher	<i>Terpsiphone paradisi</i> (Linnaeus, 1758)	C	R	E,GS,M, D,S,H
203.	Black-naped Monarch-Flycatcher	<i>Hypothymis azurea</i> (Boddaert, 1783)	UC	R	E,GS, M,D
204.	Subfamily RHIPIDURINAE White-browed Fantail-Flycatcher	<i>Rhipidura aureola</i> Lesson, 1830	C	R	M,D,S
205.	White-throated Fantail-Flycatcher	<i>Rhipidura albicollis</i> (Vieillot, 1818)	R	R	D,S
206.	Family PARIDAE Great Tit	<i>Parus major</i> (Linnaeus, 1758)	VC	R	M,D, S,H
207.	Pied Tit	<i>Parus nuchalis</i> Jerdon, 1844	R	R	D
208.	Black-lored Yellow Tit	<i>Parus xanthogenys</i> Vigors, 1831	R	R	E,GS
209.	Family SITTIDAE Chestnut-bellied Nuthatch	<i>Sitta castanea</i> Lesson, 1830	C	R	E,GS, M,D
210.	Velvet-fronted Nuthatch	<i>Sitta frontalis</i> Swainson, 1820	VC	R	E,GS, M,D
211.	Family DICAEIDAE Thick-billed Flowerpecker	<i>Dicaeum agile</i> (Tickell, 1833)	C	R	E,GS,M
212.	Tickell's Flowerpecker	<i>Dicaeum erythrorhynchos</i> (Latham, 1790)	VC	R	E,GS,M, D,S,H
213.	Plain Flowerpecker	<i>Dicaeum concolor</i> Jerdon, 1840	C	R	E,GS, M,D,S

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat*
	Family NECTARINIIDAE				
214.	Purple-rumped Sunbird	<i>Nectarinia zeylonica</i> (Linnaeus, 1766)	VC	R	E,GS,M, D,S,H
215.	Small Sunbird	<i>Nectarinia minima</i> (Sykes, 1832)	R	R	E,GS
216.	Loten's Sunbird	<i>Nectarinia lotenia</i> (Linnaeus, 1766)	UC	R	E,M
217.	Purple Sunbird	<i>Nectarinia asiatica</i> (Latham, 1790)	VC	R	E,GS,M, D,S,H
	Family ZOSTEROPIDAE				
218.	White-eye	<i>Zosterops palpebrosa</i> (Temminck, 1824)	C	R	E,GS,M, D,S,H
	Family FRINGILLIDAE				
219.	Common Rosefinch	<i>Carpodacus erythrinus</i> (Pallas, 1770)	C	M	E,GS, M,H
	Family ESTRILDIDAE				
220.	Red Munia	<i>Amandava amandava</i> (Linnaeus, 1758)	C	R	H,F
221.	White-throated Munia	<i>Lonchura malabarica</i> (Linnaeus, 1758)	C	R	H,F
222.	White-rumped Munia	<i>Lonchura striata</i> (Linnaeus, 1766)	C	R	D,S,H,F
223.	Black-throated Munia	<i>Lonchura kelaarti</i> (Jerdon, 1863)	R	R	H,F
224.	Spotted Munia	<i>Lonchura punctulata</i> (Linnaeus, 1758)	VC	R	H,F
225.	Black-headed Munia	<i>Lonchura malacca</i> (Linnaeus, 1766)	C	R	D,S,H,F
	Family PLOCEIDAE				
	Subfamily PASSERINAE				
226.	House Sparrow	<i>Passer domesticus</i> (Linnaeus, 1758)	C	R	H,F

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat#
227.	Yellow-throated Sparrow Subfamily PLOCEINAE	<i>Petronia xanthocollis</i> (Burton, 1838)	UC	R	H,F
228.	Baya Weaver Family STURNIDAE	<i>Ploceus philippinus</i> (Linnaeus, 1766)	C	R	F
229.	Grey-headed Myna	<i>Sturnus malabaricus</i> (Gmelin, 1789)	UC	R	M,D, H,F
230.	Brahminy Starling	<i>Sturnus pagodarum</i> (Gmelin, 1789)	C	R	M,D, H,F
231.	Rosy Starling	<i>Sturnus roseus</i> (Linnaeus, 1758)	C	M	M,F
232.	Common Myna	<i>Acridotheres tristis</i> (Linnaeus, 1766)	VC	R	E,M,D, H,F
233.	Jungle Myna	<i>Acridotheres fuscus</i> (Wagler, 1827)	C	R	E,M,D, H,F
234.	Common Hill Myna Family ORIOLIDAE	<i>Gracula religiosa</i> (Linnaeus, 1758)	C	R	E,GS,M
235.	Eurasian Golden Oriole	<i>Oriolus oriolus</i> (Linnaeus, 1758)	C	M	E,GS,M, D,H
236.	Black-naped Oriole	<i>Oriolus chinensis</i> (Linnaeus, 1766)	UC	M	E,M
237.	Black-headed Oriole Family ARTAMIDAE	<i>Oriolus xanthornus</i> (Linnaeus, 1758)	C	R	E,M, D,H
238.	Ashy Woodswallow	<i>Artamus fuscus</i> Vieillot, 1817	C	R	M,D, S,H

Table : Contd.

Sl. No.	Common Name	Scientific Name	Occurrence	Status*	Habitat#
	Family DICRURIDAE				
239.	Black Drongo	<i>Dicrurus macrocercus</i> Vieillot, 1817	C	R	E,M,D, S,H,F
240.	Ashy Drongo	<i>Dicrurus leucophaeus</i> Vieillot, 1817	R	M	M,D
241.	White-bellied Drongo	<i>Dicrurus caerulescens</i> (Linnaeus, 1758)	VC	R	M,D,S
242.	Bronzed Drongo	<i>Dicrurus aeneus</i> Vieillot, 1817	C	R	M,D
243.	Spangled Drongo	<i>Dicrurus hottentottus</i> (Linnaeus, 1766)	UC	R	E,M
244.	Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i> (Linnaeus, 1766)	C	R	E,M
	Family CORVIDAE				
245.	Indian Treepie	<i>Dendrocitta vagabunda</i> (Latham, 1790)	C	R	E,GS,M, D,S,H
246.	White-bellied Tree Pie	<i>Dendrocitta leucogastra</i> Gould, 1833	R	R	E
247.	House Crow	<i>Corvus splendens</i> Vieillot, 1817	VC	R	M,D,S, H,F,R
248.	Jungle Crow	<i>Corvus macrorhynchos</i> Wagler, 1827	VC	R	E,M,D, S,H,F

* E- Evergreen, M- Moist deciduous, D- Dry deciduous, GS- Grassland-Shola, F- Agro fields, H- Habitation, P- pond/Lake, R- Reservoir, Ri- Riparian.

R- Resident, M- Migratory, LM- Local migratory;

** VC- Very common, C- Common, UC- Uncommon, R- Rare.

SUMMARY

Biligiri Rangaswamy Temple Wildlife Sanctuary has high bird diversity compared to other protected areas of Karnataka. This may be due to the high habitat diversity ranging from scrub forest to high altitude grassland-shola forests along with altitudinal variation ranging from 600 m to 1800 m.

Western Ghats harbor 16 endemic species of which seven occur in BRT wildlife sanctuary. They are Nilgiri Wood Pigeon, Small Green Barbet, Loten's Sunbird, Black and Orange Flycatcher, Nilgiri Verditer Flycatcher and Rufous Babbler were also recorded from the sanctuary. The endemic species account for 3.2 percent of the total bird diversity of Biligiri Rangaswamy Temple Wildlife Sanctuary. Only a few times, Nilgiri Wood Pigeon and Black and Orange Flycatcher were recorded.

REFERENCES

- ALI, S. and H. WHISTLER. 1942a. The Birds of Mysore. Part I. *Bombay Nat. Hist. Society*, **43** : 130–147.
- ALI, S. and H. WHISTLER. 1942b. The Birds of Mysore. Part II. *Bombay Nat. Hist. Society*, **43** : 318–341.
- ALI, S. and H. WHISTLER. 1943a. The Birds of Mysore. Part III. *Bombay Nat. Hist. Society*, **43** : 573–595.
- ALI, S. and H. WHISTLER. 1943b. The Birds of Mysore. Part IV. *Bombay Nat. Hist. Society*, **44** : 9–26.
- ALI, S. and H. WHISTLER. 1943c. The Birds of Mysore. Part V. *Bombay Nat. Hist. Society*, **44** : 206–220.
- ALI, S. and S.D. RIPLEY. 1983. *Handbook of the Birds of India and Pakistan* (Compact Edition). Oxford University Press and BNHS, Bombay.
- ALI, S. AND S.D. RIPLEY. 1995. *The Pictorial Guide to the Birds of Indian Sub-continent*. Oxford University Press and BNHS, Bombay.
- ARAVIND, N.A., D. RAO and P.S. MADHUSUDAN. 2001. Additions to the birds of Biligiri Rangaswamy Temple Wildlife Sanctuary, Western Ghats, India. *Zoo's Print Journal*, **16** : 541–547.
- BASKARAN, S.T. 1992. Sighting of Dusky Horned Owl. *Newsletter for Birdwatchers*, **32** : 17.
- KARTHIKEYAN, S., J.N. PRASAD and T.S. SRINIVASA. 1995. Yellowthroated Bulbul *Pycnonotus xantholaemus* (Jerdon) at Biligirangan Hills, Karnataka. *Bombay Nat. Hist. Society*, **92** : 123–124.

- MANAKDAN, R. and PITTE, A. 2001. Standardised common and scientific names of the birds of the Indian Subcontinent. *Buceros*, 6 : 1-48.
- MORRIS, R.C. 1927. A junglefowl problem. *Bombay nat. Hist. Society*, 38 : 190.
- MORRIS, R.C. 1939. On the occurrence of the Banded Crake (*Rallus amuroptera*) and the Malabar Woodpecker (*Macropicus hodgsonii*) in the Biligirirangan Hills, South India. *Bombay nat. Hist. Society*, 40 : 763.
- RAMESH, B.R. 1989. Flora of Biligirirangan Hills. Ph.D. Thesis submitted to Madras University, Madras.
- SRINIVASA, T. S., S. KARTHIKEYAN and J.N. PRASAD. 1997. *Faunal Survey of Biligiri Rangasamy Temple Wildlife Sanctuary*. Merlin Naure Club, Bangalore.
- UTTANGI, J.C. 2000. Ornithological tour of B.R. Hills Wildlife Sanctuary at K. Gudi. *Newsletter for Birdwatchers*, 40 : 45-47.

MAMMALS

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INTRODUCTION

Mammals are high priority and charismatic species requiring conservation. They are threatened due to habitat loss and destruction, poaching, fragmentation etc. Several species are listed in the global red data book. A systematic survey of mammals remains to be conducted in Biligiri Rangaswamy Temple Wildlife Sanctuary. Only survey data available on mammals is by Srinivasa *et al.* (1997) and they have recorded nearly 20 species. This study is more comprehensive than previous ones.

We have not devised any systematic sampling method for mammals. Only opportunistic sampling was carried out. Whenever a mammal was spotted, information such as habitat, date, time of the day etc. were recorded. This helped us to determine whether the species is common, uncommon or rare and most commonly used habitat. Apart from direct visual record, indirect evidence such as scat or pellets, burrows, calls etc. were also considered. We haven't collected any mammal species since most of the species can be easily identified without collecting specimens and also collection is prohibited since Biligiri Rangaswamy Temple is a wildlife sanctuary. Only one species of rodent viz. *Mus badooga*, caught accidentally in a trap was identified and released back.

OBSERVATIONS

In Biligiri Rangaswamy Temple Wildlife Sanctuary, 35 species of mammals belonging to 29 genera accommodated in 18 families and 8 orders have been recorded (Table 1). This accounts for approximately 21% of India's mammalian fauna. However, this list is not exhaustive and in this list rodents and bats are under represented. Complete survey of these groups might add up another 10 to 15 species. Complete list of species is given in the Table 2. Of the 35 species recorded five species endemic to Western Ghats were found in Biligiri Rangaswamy Temple Wildlife Sanctuary are Mouse Deer, Flying Squirrel, Malabar Giant Squirrel, Ruddy mongoose and Four-horned Antelope. The most common

are Blacknaped Hare, Bonnet Monkey, and Wild Boar, which are found in all the habitat of the sanctuary. Whereas, Four-horned Antelope, Indian Pangolin, and Jackal are rare species found only in one habitat.

Table 1. Taxonomic breakup of mammals found in India and Biligiri Rangaswamy Temple Wildlife Sanctuary respectively

Taxon	India	BR Hills	% of India
Orders	13	8	61.54
Family	37	18	48.65
Genus	140	29	20.71
Species	321	35	11.21

REFERENCES

SRINIVASA, T. S., KARTHIKEYAN, S. and PRASAD, J.N. 1997. *Faunal Survey of Biligiri Rangasamy Temple Wildlife Sanctuary*. Merlin Naure Club, Bangalore.

Table-2. List of species recorded from BRTWS

Sl. No.	Species	Scientific Name	Status	Habitat*	Threat
1.	Order PROBOSCIDEA Family ELEPHANTIDAE Asian Elephant	<i>Elephas maximus</i> Linnaeus	C	SJ, DD, MD, GS	Endangered
2.	Order ARTIODACTYLA Family CERVIDAE Sambar	<i>Cervus unicolor</i> Kerr	C	DD,MD,GS, EG	
3.	Spotted Deer or Chital	<i>Axis axis</i> (Erxleben)	C	DD, MD	
4.	Barking Deer or Muntjac	<i>Muntiacus muntjak</i> (Zimmermann)	C	SJ,DD,MD,EG	
5.	Family BOVIDAE Gaur or Indian Bison	<i>Bos gaurus</i> H. Smith	C	SJ,DD,MD,GS,EG	Vulnerable
6.	Fourhorned Antelope or Chowsingha	<i>Tetracerus quadricornis</i> (Blainville)	UC	SJ	Vulnerable
7.	Family TRAGULIDAE Mouse Deer or Indian Chervotin	<i>Tragulus meminna</i> (Erxleben)	UC	MD, EG	
8.	Family SUIDAE Wild Boar	<i>Sus scrofa</i> Linnaeus	C	HB,SJ,DD,MD,GS, EG	
9.	Order PHOLIDOTA Family MANIDAE Indian Pangolin*	<i>Manis crassicaudata</i> Gray	R	EG	
10.	Order CARNIVORA Family FELIDAE Tiger	<i>Panthera tigris tigris</i>	UC	SJ,DD,MD,GS	Endangered

Table 2. Contd.

Sl. No.	Species	Scientific Name	Status	Habitat*	Threat
11.	Leopard	<i>Panthera pardus</i> Linnaeus	C	SJ,DD,MD	
12.	Jungle Cat	<i>Felis chaus</i> Guldenstaedt	C	DD,MD	
	Family URSIDAE				
13.	Sloth Bear	<i>Melursus ursinus</i> (Shaw)	C	SJ,DD,MD,EG	
	Family HERPESTIDAE				
14.	Common Mongoose	<i>Herpestes edwardsi</i> (Geoffroy)	C	HB,SJ,DD,MD,EG	
15.	Ruddy Mongoose	<i>Herpestes smithii</i> Gray	C	DD, MD	
16.	Stripenecked Mongoose	<i>Herpestes vitticollis</i> Bennett	C	DD, MD	
	Family VIVERRIDAE				
17.	Small Indian Civert	<i>Viverricula indica</i> (Desmarest)	C	HB,SJ,DD,MD	
18.	Common Palm Civet or Toddy Cat	<i>Paradoxurus hermaphroditus</i> (Pallas)	C	SJ,DD,MD	
	Family CANIDAE				
19.	Jackal	<i>Canis aureus</i> Linnaeus	C	SJ	
20.	Indian Fox	<i>Vulpes bengalensis</i> (Shaw)	UC	SJ, DD	
21.	Indian Wild Dog or Dhole	<i>Cuon alpinus</i> (Pallas)	C	SJ, DD, MD	Vulnerable
	Order LAGOMORPHA				
	Family LEPORIDAE				
22.	Blacknaped Hare	<i>Lepus nigricollis</i> F. Cuvier	C	HB,SJ,DD, MD, GS,EG	
	Order RODENTIA				
	Family HYSTRICIDAE				
23.	Porcupine	<i>Hystrix indica</i> Kerr	C	SJ, DD,MD, GS,EG	
	Family MURINAE				
24.	House Mouse	<i>Mus musculus</i> Linnaeus	C	HB	

Table 2. Contd.

Sl. No.	Species	Scientific Name	Status	Habitat*	Threat
25.	Field Mouse	<i>Mus booduga</i> (Gray)	C	HB,MD	
26.	Bush Rat	<i>Golunda ellioti</i> Gray	C	MD	
27.	Bandicoot Rat	<i>Bandicota indica</i> (Bechstein)	C	HB,DD,MD	
28.	Indian Mole Rat	<i>Bandicota bengalensis</i> (Gray & Hardwicke)	C	DD,MD	
	Family SCIURIDAE				
29.	Malabar Giant Squirrel	<i>Ratufa india</i> (Erxleben)	C	MD, GS,EG	Vulnerable
30.	Three-striped Palm Squirrel	<i>Funambulus palmarum</i> (Linn.)	C	HB,SJ,DD,EG	
	Family PTEROMYIDAE				
31.	Flying Squirrel	<i>Petaurista petaurista</i> (Pallas)	UC	MD, GS,EG	
	Order INSECTIVORA				
	Family SORICIDAE				
32.	Grey woodland Shrew	<i>Crocidura attenuata</i> (Linnaeus)	UC	HB,MD,EG	
	Order PRIMATE				
	Family CERCOPITHECIDAE				
33.	Common Langur or Hanuman Langur	<i>Presbytis entellus</i> (Dufresne)	C	DD,MD,GS,EG HB,SJ,DD,MD,GS	
34.	Bonnet Macaque	<i>Macaca radiata</i> (Geoffroy)	C	EG	
	Order CHIROPTERA				
	Family PTEROPIDAE				
35.	Flying Fox	<i>Pteropus giganteus</i> (Brunnich)	C	HB,DD,MD,EG	
36.	Shortnosed Fruit Bat	<i>Cynopterus sphinx</i>	C	HB,SJ,DD,MD,EG	

* Not seen by the author. Based on indirect evidence and knowledge of locals.